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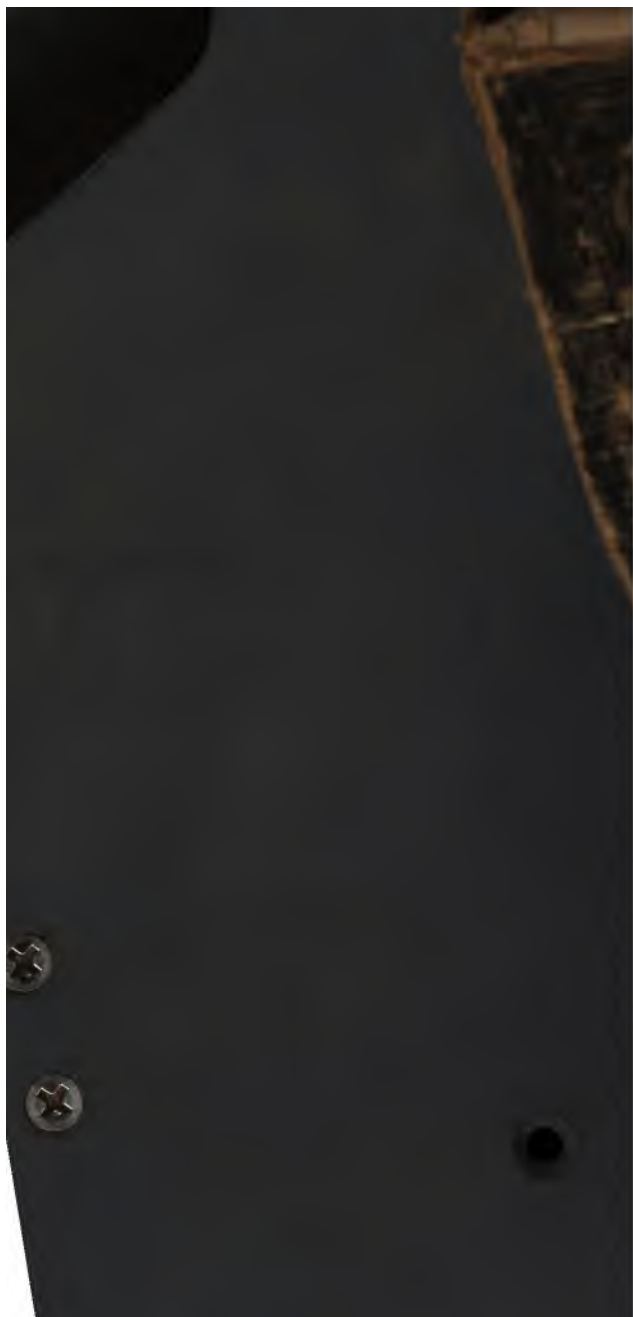
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THE
HISTORY OF THE
CITY OF NEW YORK
FROM 1609 TO 1812

BY
JOHN B. HOGAN

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° ARITHMETICAL PROBLEMS,

OR

QUESTIONS IN ARITHMETIC,

FOR THE USE OF

ADVANCED CLASSES IN SCHOOLS.

BY W. H. FARRAR, A. M.

PRINCIPAL OF THE WOONSOCKET HIGH SCHOOL.



BOSTON:

BREWER AND TILESTON.

1863.

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PREFACE.

THIS work is not designed to take the place of any other, but to supply an actual deficiency. There is no want of excellent text-books of arithmetic, in which the principles of the science are all explained, and abundantly illustrated. Indeed, everything is made so plain and simple that a sufficient field for original, independent investigation is hardly afforded. But little necessity for mental exertion being imposed upon the pupil, he naturally, in the use of such books alone, thinks but little. Hence the very general complaint that scholars, from our schools, on entering into business that requires mathematical calculation, do not possess the requisite knowledge of the subject to render them immediately useful. Frequent references must be made to text-books, or an effort must be made to recollect the rule, and to determine what rule applies in each particular case.

They are obliged to proceed in this manner until, by necessity, that knowledge is acquired in the workshop, or the counting-room, that should have been acquired in the school-room.

That such complaints are not entirely groundless, every business man knows full well. It is hoped that the little volume now offered to the public will contribute, in some measure, to the necessary improvement in this respect.

It is the design of this work, by the absence of all rules and explanations, to throw the pupil back upon his own mental resources; to impose upon him the necessity, or at least afford him the opportunity, of patient investigation, and close and vigorous application of thought, and to induce him to feel that he, as well

as others, is endowed with the requisite mental capacity for such labor.

The questions are generally of a practical nature; yet many that are not so have been introduced, for the purpose of developing and strengthening the power of analysis. Such questions will be found eminently useful in promoting readiness and quickness of perception.

The author has endeavored to avoid producing that weariness of the subject, that a multitude of questions, little varied in their character, depending on the same principle, invariably produces. He has endeavored to arrange the questions so that novelty shall contribute to the interest of the pupil. The same principle, however, recurs again and again, but after such intervals as will not be likely to render it an unpleasant or unwelcome acquaintance.

Some of the principles that lie at the foundation of mensuration will be found on the opposite page, being inserted for the benefit of such teachers as are not familiar with geometry.

It is recommended that teachers in the use of this work should avoid, as far as practicable, solving the questions for the pupil. Let the class, in going through for the first time, omit such questions as they cannot solve, marking them for another trial. Let the pupil be required to explain the principles on which the solutions depend; and, when the question is capable of several solutions, let them be given, and determine which is preferable.

To all such teachers as are desirous of seeing their pupils independent, ready and thorough arithmeticians, this work is most respectfully dedicated.

W. H. FARRAR

WOONSOCKET, R. I., Dec. 10, 1852.

GEOMETRICAL PRINCIPLES.

1. A TRIANGLE is one half a rectangle having the same base and the same altitude.

2. A pyramid, or cone, is equal to one third of a prism, or cylinder, having the same base and the same altitude.

3. Bodies that have the same shape are similar.

4. All similar surfaces are to each other as the squares of their like dimensions.

5. The solidities of all similar bodies are to each other as the cubes of their like dimensions.

6. The ratio of the circumference to the diameter of a circle is nearly 3.1416.

7. The circle may be considered as made up of an indefinite number of triangles, having their apexes all at the centre, their united bases forming the circumference.

8. The side of a hexagon, inscribed in a circle, is equal to the radius of that circle.

9. The convex surface of a globe is equal to four circles of the same diameter.

10. The globe may be considered as made up of an indefinite number of pyramids, having their apexes in the centre, their united bases forming the convex surface.

11. If a be any number, and $b + c = a$, c being less than b , then

$$\sqrt{\left(\frac{a}{2}\right)^2 - bc} = \frac{a}{2} - c, \text{ and also, } b - \frac{a}{2}.$$

1*



ARITHMETICAL QUESTIONS.

1. At \$15.50 per ton, what is the value of one cwt. of hay?

2. What number is that which, being divided by $2\frac{1}{2}$, will give $\frac{1}{4}$?

3. A man divided a ton of coal between two poor families, giving one $\frac{2}{3}$ as much as the other. How much did each receive?

4. If 20 per cent. of what I receive for my goods is gain, what is my gain per cent.?

5. If a man, who owns $\frac{2}{3}$ of a house, sells $\frac{1}{3}$ of his share for \$600, what is the value of the whole house?

6. A gentleman, having \$50, paid, in Boston, 10s. 6d. for a pair of shoes, 15s. for a hat, \$25.37 $\frac{1}{2}$ for a coat, gave 4s. 6d. to some beggars, and paid 7s. 6d. at his tavern. How much had he left?

7. A man purchased 25 shares in the Concord Railroad at $12\frac{1}{2}$ per cent. below par, and sold the same at $12\frac{1}{2}$ per cent. above par. What did he gain per cent., and what in all, the par value being \$50?

8. At what time, between 4 and 5 o'clock, are the hour and minute hands of a clock together?

9. If, after insuring a factory for \$50,000, 15 years, at $2\frac{1}{2}$ per cent., it is destroyed in the end of the 15th year, what will be the actual loss of the company, allowing 6 per cent. compound interest?

10. For what sum must my note be given at a bank, payable in 60 days, at 6 per cent., to obtain \$500?

11. What is the area of a triangle, the sides of which measure 40, 46, and 50 feet?

12. A farmer has a plough which cuts a furrow 18 inches wide. How far must his team walk to plough a field of 4 acres, allowing one rod in 25 for turning at the corners?

13. If $\frac{2}{3}$ of a ton of steel cost \$24, what is the cost of 2 tons, 13 cwt., 2 qrs., and 14 lbs.?

14. A grocer bought a number of bushels of potatoes for \$20.25, and paid as many cents per bushel as he bought bushels. How many bushels did he buy?

15. A man, being asked how many sheep he had, said: "If the number be multiplied by 3, and $\frac{2}{3}$ of the product be multiplied by 3, $\frac{2}{3}$ of the result will be 16." How many had he?

16. What is the entire surface of a rectangular block

of granite, 14 ft. 7 in. long, 4 ft. 5 in. wide, and 2 ft. 4 in. thick?

17. What is the weight of such a block, its specific gravity being 2650, i. e., a cubic foot weighing 2650 oz. Av.?

18. John had 36 marbles, James had 25 per cent. more than John; but, after playing, James had one more than 50 per cent. more than John. How many did James win?

19. The flash of a cannon is seen in the night, and the report is heard 1 minute 13 seconds afterwards. How far distant is the cannon, sound travelling at the rate of 1142 ft. per sec.?

20. A man bought a horse, on six months' credit, for \$95, and sold him immediately for \$98, cash. How much did he gain, interest being 6 per cent.?

21. A stone is $1\frac{1}{4}$ times as long as it is wide, and $\frac{1}{4}$ as thick as it is long, and contains $33\frac{1}{4}$ cubic feet. What is its size?

22. If I buy goods for \$20, and sell them for \$28, what per cent. do I gain?

23. If 1200 bushels of wheat cost \$1560, what is the price of $\frac{3}{4}$ of a peck?

24. A farmer went to Providence with a load of produce. He sold to J. W. Winsor 327 lbs. of cheese at 6d. per lb., and 120 lbs. of butter at 1s. 3d. per lb.; to John Snow 11 bushels of potatoes at 3s. 6d. per bushel

and, to W. C. Clough, 21 bushels of oats at 2s. 3d. per bushel. Out of what he received, he paid expenses 50 cents, bought $32\frac{1}{2}$ yds. of sheeting at $7\frac{1}{4}$ cents per yd., and 3 yds. of kerseymere at 7s. 6d. per yd. How much money had he left?

25. What is the net weight of 64 boxes of soap, weighing 6310 lbs., allowing 4 lbs. per box for draft, and 12 per cent. for tare?

26. In a shower $\frac{1}{2}$ of an inch of rain fell. How many hogsheds fell on an acre of surface?

27. If, when wheat is worth 6s. 3d. per bushel, the penny loaf weighs 9 oz., what should it weigh when wheat is worth 8s. $2\frac{1}{4}$ d. per bushel?

28. A, B, and C are to divide between them \$1000. A is to have \$120 more than C, and B is to have \$95 less than C. What will be the share of each?

29. At 2s. 6d., N. Y. cur., per yd., what cost 1504 yards of cloth?

30. A grocer bought a quantity of flour for \$2400, and, having kept it 3 months, sold it at 10 per cent. advance, on 9 months' credit. What did he gain, money being worth 6 per cent.?

31. I go to New York and purchase 100 bbls. of flour at \$4.25 per bbl.; 150 bushels of corn at $62\frac{1}{2}$ cents per bush., and 50 bush. of rye at 75 cents per bush. My expenses are \$10, and I pay \$30 freight. How

must I sell my flour, corn, and rye to gain 7 per cent., if I divide the freight and expenses in proportion to the cost of each?

32. What cost 6096 yards of ticking at 1s. 1d. per yard, N. E. cur.?

33. A man bought a sheep, a cow, and a horse, for \$90; the cow cost four times as much as the sheep, and the horse twice as much as both the others. What was the cost of each?

34. John can cut a cord of wood in 5 hours, Samuel can do it in 8 hours, and James in 10 hours. How long will it take all three to do the same?

35. If I buy cloth at the rate of \$1 for 3 yards, and sell it at the rate of \$2 for 5 yards, how many yards must I sell to gain \$20?

36. How many square feet of square-edged boards, of equal width, can be sawn from a log 18 inches in diameter, and 16 feet long, the boards being $1\frac{1}{4}$ inches thick, and the saw cut $\frac{1}{4}$ inch?

37. From 14 years subtract 11 years, 11 months, 11 weeks, 11 days, 11 hours, 11 minutes, and 11 seconds.

38. If \$1 is worth 56 $\frac{1}{2}$ d., what is the value of \$500?

39. If, when wheat is worth \$1.25 per bushel, a 6 cent loaf weighs 28 oz., and affords the baker 2 cents a loaf for his labor, what should it weigh when wheat is

worth \$1.50 per bushel, to afford him the same profit on a loaf?

40. What is the interest of \$622.25, for 2 years, 5 months, and 26 days, at 7 per cent.?

41. What number is that which, being increased by $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$, of itself, will amount to 234 $\frac{1}{2}$?

42. What cost 7 $\frac{1}{2}$ lbs. of beef at 6 $\frac{1}{2}$ cents per pound?

43. A vessel is supplied by 3 pipes; the first will fill it in $\frac{1}{2}$ an hour, the second in $\frac{2}{3}$ of an hour, the third in $\frac{3}{4}$ of an hour. In what time will all three fill it?

44. I owe John Chase \$120, to be paid in 8 months, \$150, to be paid in one year, \$500, in 1 year and 3 months, and \$100, in 2 years. What will be the equated time for the payment of the whole?

45. Said John to Charles, "You have 8 marbles, and if $\frac{1}{4}$ of what we both have be added to what you have, the sum will be equal to what I have." How many had John?

46. I have a field 46 $\frac{1}{2}$ rods wide. What length must I cut off from the end to set off 10 acres?

47. A quarter of meal will last a horse and a colt 18 days, and will last the horse alone 24 days. How long will it last the colt?

48. What cost 1526 lbs. of butter, in New York, at 1s. 3d. per pound?

49. A trader bought a hogshead of molasses, containing 130 gallons, for \$26. How must he sell it per gallon to gain 10 per cent.?

50. What fraction is that which, being multiplied by 12, will produce $\frac{1}{4}$?

51. Two boys own a water-melon in the proportion of $\frac{1}{3}$ and $\frac{2}{3}$; a third boy joins them in eating it, and pays them a shilling for his share. What part of the shilling should each of the first two receive?

52. A man, having a field 50 rods square, sold to A 120 square rods, to B 4 acres, and to C 30 rods square. What part of the field remained unsold?

53. A bin is 10 feet long and 4 feet wide. How high must it be made to hold 400 bushels of wheat?

54. If $\frac{3}{4}$ of what I receive for my carriage is gain, what is my gain per cent.?

55. John's money is to Peter's as 5 to 8; Peter has \$1.12. How much has John?

56. The diagonal of a square field is 80 rods. How many acres in the field?

57. In a pile of wood 7 feet 6 inches long, 4 feet 1 inch wide, and 5 feet 3 inches high, how many cords?

58. When $\frac{1}{4}$ of a ton of steel costs \$120, what will be the cost of $3\frac{3}{4}$ tons?

59. Bought 5 acres of land at \$150 per acre, and, having kept it 15 years, sold it at 20 cents per foot. What is the gain, allowing 6 per cent. compound interest?

60. A man having 25£, gave $3\frac{1}{4}$ £ for a coat, $2\frac{1}{2}$ £ for a hat, $1\frac{1}{2}$ £ for a vest, $1\frac{1}{4}$ £ for a pair of boots, 14s. for a pair of gloves, 2s. 6d. for a cane, and 3s. 6d. for a handkerchief. How much had he left?

61. If $22\frac{1}{2}$ ells English of broadcloth cost \$65.36, what cost $42\frac{1}{2}$ yards?

62. John Smith bought of James Johnson,

2000 yards of Cotton cloth,	●	$7\frac{1}{4}$ cts. per yd.
600 " " Calico,	"	$10\frac{1}{2}$ " " "
220 " " Mouslin de laine,	"	17 " " "
150 " " Broadcloth,	"	\$2.25 " " "
500 " " Flannel,	"	30 " " "

What is the amount of the bill?

63. For cash, Johnson allows a discount of 12 per cent. How much does Smith pay him?

64. Mr. Smith wishes to sell the above, at retail, so as to gain 25 per cent. What should be the price of each per yard?

65. A square pyramid, 90 feet high, contains 14,520 cubic feet. What is the length of one side of the base?

66. A note, for \$620, was given January 10, 1847, on interest at 6 per cent. after 60 days. What is the amount July 20, 1852?

67. A circle is 27 feet in diameter. What is its circumference?

68. A ship's crew of 300 men were so supplied with provision for 12 months, that each man was allowed 30 oz. per day; but, after being out 6 months, they find it will take 9 months to complete the voyage, and 50 of the crew leave the ship. What must be the daily allowance of each man for the last 9 months?

69. A father divided his property among his 3 sons, giving A \$4 as often as B \$3, and C \$5 as often as B \$6. What was the whole property, A's share being \$5000?

70. If I sell 500 deals at 15 cents each, and lose 9 per cent., what do I lose in all?

71. $\frac{1}{3}$ of a certain number exceeds $\frac{1}{4}$ of the same number by 6. What is the number?

72. What cost 1654 lbs. of butter, in New York, at 1s. 6d. per lb.?

73. A cistern has a pipe that brings in 4 gallons, 3 quarts per hour; it has another that carries out 3 gallons,

2 quarts, and 1 pint per hour. If the cistern holds 600 gallons, in what time will it be filled?

74. Four men, A, B, C and D, wish to divide \$12 between them. They agree that A shall have $\frac{1}{4}$ of it, B $\frac{1}{4}$, C $\frac{1}{4}$, and D $\frac{1}{4}$. What should each have, according to this agreement?

75. If a certain number be diminished by 7, and the remainder be divided by 8, and the quotient be multiplied by 5, that product increased by 4, the square root of the sum extracted, and $\frac{1}{4}$ of that root be cubed, and that cube be divided by 9, the last quotient will be 24. What is that number?

76. A bankrupt, whose effects are worth \$5640, can pay only \$.225 on a dollar, what does he owe?

77. If a person spends as much in 4 months as he earns in 3, how much can he lay by annually, supposing he earns 120£ 10s. every 6 months?

78. If 3 men or 4 women can do a piece of work in 56 days, how long will it take one man and one woman to do the same work?

79. A merchant bought 100 gallons of alcohol at 62 $\frac{1}{2}$ cents per gallon. How much water must be added that he may sell the mixture at 50 cents per gallon, and gain 20 per cent.?

80. What must I pay per hogshead for molasses, that I may keep it 8 months, when money is worth 6 per

cent., and then sell it at \$42 per hogshead, and gain 12 per cent. ?

81. How many English ells of broadcloth can I buy for \$165, at \$3 per yard ?

82. It is required to divide the number 108 into three such parts that $\frac{1}{2}$ of the first, $\frac{1}{3}$ of the second, and $\frac{1}{4}$ of the third shall be equal to each other. What are the parts ?

83. I have $145\frac{1}{8}$ feet of inch boards, from which I would make a cubical box. How large can I make it ?

84. If, by selling goods at \$2 $\frac{1}{2}$ per cwt., I lose 20 per cent., what per cent. do I lose by selling them at \$3 per cwt. ?

85. What weight, at the distance of 62 inches from the fulcrum of a lever, will balance a hogshead of molasses, weighing 1200 pounds, at the distance of $1\frac{1}{2}$ inches from the fulcrum ?

86. What cost 2896 yards de laine, at 1s. 6d. per yard, in New England ?

87. The foot of a ladder, 60 feet long, remaining in the same place, the top will just reach a window 40 feet high on one side of the street and another 30 feet high on the other side. How wide is the street ?

88. What will $72\frac{1}{2}$ yards of cloth come to at \$1.18 per yard ?

89. What will be the amount of 150£ 12s. 6d. for 2 years, 8 months, 24 days, at 6 per cent. per annum?

90. In a certain pasture there are 256 animals. There are 6 times as many cows as horses, and 40 less than 5 times as many sheep as cows. How many of each kind are there?

91. What cost 4800 pounds of tea in New York, at 2s. 6d. per pound?

92. Bought a hogshead of molasses, containing 126 gallons, for \$35; but a part of it having leaked out, I sell the remainder at $32\frac{1}{2}$ cents per gallon, and lose 7 per cent. How many gallons leaked out?

93. I sell cloth at 66 cents per yard, and thereby lose 12 per cent. What per cent. shall I make by selling the same at $82\frac{1}{2}$ cents per yard?

94. If 20 men, when the days are 12 hours long, build a wall 50 rods long, 8 feet high, and 5 feet thick, in $24\frac{1}{2}$ days, how many days will it take 7 men to build a wall 75 rods long, 7 feet high, and 4 feet thick, when the days are 9 hours long?

95. A man had a sum of money, $\frac{1}{4}$ of which he spent; afterwards he received \$100, when he found he had twice as much as at first. What had he at first?

96. John Smith shipped from Boston to Havana, 200 tons of ice, which cost him, on board ships, \$2.50 per ton; he paid \$2.50 per ton freight, and \$50 for insur

ance. He sold his ice at \$9 per ton, and received his pay in oranges, at \$1.50 per box, on board ship; and paid 50 cents per box, freight, and \$75 for insurance. A commission merchant sells his oranges at \$2.50 per box, to whom he pays 4 per cent. commission. Duties and other charges amount to \$362.50. What is his gain?

97. The profits of a farm are 8 per cent. greater this year than last. This year they are \$945. What were they last year?

98. What cost 7200 pounds of sugar in New York, at 8d. per pound?

99. A and B can do a piece of work in 12 days, A and C can do it in 15 days, and B and C can do it in 20 days. How long will it take each to do it alone?

100. If, by selling goods at \$2.50 per cwt., I gain 20 per cent., what do I gain by selling the same goods at \$2.25 per cwt.?

101. If $\frac{1}{15}$ of a ship cost \$7812.50, what is the whole ship worth?

102. Bought 200 yards of cambric for 90£, but, it being damaged, I am willing to lose 7£ 10s. on it. What must I demand per ell English?

103. If a man perform a journey in 5 days, when the days are 12 hours long, in how many days will he perform it when the days are 10 hours long?

104. How much water must be mixed with 100 gallons of alcohol, worth 7s. 6d. per gallon, to reduce its value to 6s. 3d. per gallon?

105. If a cone, 5 feet in diameter at the base, weighs 500 pounds, what will be the diameter of a similar cone weighing 4000 pounds?

106. What is the price of $27\frac{1}{2}$ yards of ribbon, at 2s. per yard, in Boston?

107. When meal is worth 5s. per bushel, and eggs 1s. per dozen, how many pounds of meal can be bought for 7 eggs, allowing 50 pounds of meal to the bushel?

Ans.

108. What is the area of a circle 25 feet in diameter?

109. A room is 40 feet long, 36 feet wide, and 18 feet high. What is the distance from the upper northern to the lower southern corner?

110. How many square yards of paper in a book of 672 pages, the leaves being $6\frac{1}{2}$ by $10\frac{1}{2}$ inches?

111. How many pounds of butter, at 1s. 3d. per pound, can be bought for 120 pounds of wool at 2s. 3d. per pound?

112. What is the interest on \$362.25 for 3 years, 6 months, 21 days, at $4\frac{1}{2}$ per cent.?

113. I have 3 cwt. 1 qr. 20 lbs. of tea, which cost me 27 cents per pound. What shall I gain by selling it at 25 cents per pound, Troy?

114. A house is 36 feet long and 28 feet wide, and the ridge is 12 feet above the beam. The roof projects one foot over the ends and eaves in all directions. How many shingles will be required to cover the roof, 6 shingles being allowed to the foot, and 10 per cent. for waste?

115. Two square fields contain 15,625 square rods; their sides are to each other as 3 to 4. What is the length of a side of each?

116. A grocer has sugars worth 6, 7, 8, and $8\frac{1}{2}$ cents per pound; of these he wishes to make a mixture of 820 pounds worth $7\frac{1}{2}$ cents per pound. How many pounds of each kind may he take?

117. What number is that of which the cube root is equal to the square root of 4225?

118. For what must I buy eggs per dozen, in order to sell them at $12\frac{1}{2}$ cents per dozen, and gain 20 per cent.?

119. A field in the form of a right-angled triangle, having its sides containing the right-angle to each other as 5 to 7, contains 7 acres. What is the length of the hypotenuse?

120. If, at the end of 8 months, I receive \$386.88 for \$372, what per cent. per annum do I charge?

121. What cost 1656 yards of silk, at 5s. 3d. per yard, in New England?

122. A gentleman wishes to make a circular pond in his garden that shall contain just $\frac{3}{4}$ of an acre. What must be the length of the line with which he strikes the circle?

123. B sells cloth, that cost him 20 cents per yard, at 25 cents per yard. How must A sell that which cost him 26 cents to gain 10 per cent. more than B?

124. If the great Chinese wall is 1200 miles long, 18 feet thick, and 17 feet high, how many stones, $8\frac{1}{2}$ feet long, $4\frac{1}{2}$ feet wide, and $2\frac{1}{2}$ feet thick, would be required to build it?

125. A person, being asked the time of day, said, "The time past noon is equal to $\frac{3}{8}$ of the time to midnight." What o'clock was it?

126. What decimal of a £ is $\frac{1}{16}$ of a farthing?

127. A farmer, being asked how many sheep he had, said: "Yonder flock contains 4920; of which my neighbor Smith owns twice as many as I; Mr. Jones owns 3 times as many as Smith; and Mr. Dow owns twice as many as Jones; and all three of them own $\frac{1}{2}$ of what I do not own." How many had he?

128. How many feet in a stock of 16 boards, 22 feet 5 inches long, 1 foot 10 inches wide at one end, and 1 foot 3 inches at the other?

130. A man, on arriving at Cincinnati, finds that his watch, which keeps correct time, is 25 minutes too slow. Did he come from the east or west, and how far?

131. A stone weighs 120 pounds in the air, and 100 pounds in water. What is the specific gravity of the stone, water being 1000?

132. If a lever, 12 feet long, rest on a prop 8 inches from one end, how many pounds' power must be applied at the other end to raise one ton?

133. If a pipe $\frac{1}{4}$ inch in diameter will fill a hogshead in $1\frac{1}{2}$ hours, how long will it take a pipe $\frac{1}{2}$ inch in diameter to fill the same?

134. A field is 72 chains (4 rods each) long, and 131 rods 10 feet wide. How many acres does it contain?

135. A cylindrical cistern is 40 feet in diameter, and 36 feet deep. How many hogsheads of water will it hold?

136. A boy bought 120 apples at 2 for a cent, and 120 more at 3 for a cent; but, not liking his bargain, he sold them all at 5 for 2 cents. Did he gain or lose by the bargain? and how much?

137. Divide 97 degrees, 7 furlongs, 35 rods, 4 feet, 2 inches, and 1 barleycorn by 6, and prove the work correct by multiplication.

138. If $\frac{3}{4}$ of a yard of cloth cost $\frac{1}{4}$ of a dollar, what will $\frac{1}{2}$ of an ell English cost?

138. Four men, at a tavern, made a bill of \$26, of which they agreed that A should pay $\frac{3}{4}$; B, $\frac{1}{4}$; C, $\frac{1}{4}$, and D, $\frac{1}{4}$. What should each pay?

139. If $\frac{3}{4}$ of a peck of wheat cost $19\frac{1}{2}$ cents, what is the cost of 1200 bushels?

140. A garden is 200 feet long, and 100 feet wide. How deep must a ditch 5 feet wide be dug around it in the border, that the earth thrown up may raise the remainder 1 foot?

141. I wish to obtain \$2000 dollars from a bank. For what sum must I give my note, payable in 5 months, the rate of discount being 6 per cent.?

142. If I send my agent \$6000, to be laid out for me, what will his commission out of it amount to, he charging $3\frac{1}{4}$ per cent. on what he pays out for me?

143. A man in California, by diligence and industry, obtained 20 pounds, 8 ounces, 15 pennyweights of gold, in one year. His living cost him \$6 per week. He sold his gold at \$18.25 per oz. What did he save?

144. What would he gain by selling his gold at the same price per oz. Avoirdupois, the oz. Av. containing $137\frac{1}{4}$ grs. Troy?

145. How many times will a wheel 12 feet 5 inches in circumference turn round in going 24 miles, 3 furlongs, 15 rods, 12 feet, and 4 inches?

146. A man bought 25 bales of cloth, each bale containing 20 pieces, and each piece 32 yards, at $7\frac{1}{2}$ cents per yard. What did he pay for it?

147. What cost 1728 yards damask at 4s. per yard in New York?

148. How many yards of carpeting $\frac{1}{4}$ of a yard wide will be required to carpet a room 17 by 18 feet?

149. I receive \$3000 with which to purchase wool for my employer. How many pounds can I buy at 42 cents per pound, taking out my commission at $5\frac{1}{2}$ per cent.?

150. A man, being asked the time of day, said that $\frac{1}{8}$ of the time past noon was equal to $\frac{1}{16}$ the time to midnight. What was the time?

151. If I buy a farm for 12 per cent. less than its value, and sell it for 10 per cent. more than its value, what do I gain per cent.?

152. A box, made of plank $2\frac{1}{4}$ inches thick, is 4 feet 3 inches long, 3 feet 2 inches wide, and 2 feet 8 inches high on the outside. How many square feet of plank in the box? and how many cubic feet will it contain?

153. A man bought a lot of land 60 rods long and 20 rods wide, at the rate of \$200 per acre. He laid out a street through the centre, lengthwise, 5 rods wide, and also 3 cross streets $3\frac{1}{4}$ rods wide, at equal distances from each other and the ends. He then divided the remainder into 16 equal house lots, by lines parallel to the cross-

streets. What is the size of the lots? and what will he gain if he sells his lots at 5 cents per foot?

154. A man wishes to make a rectangular box, the inside lengths of the sides of which shall be to each other as 2, 3, and 4, which shall contain 648 cubic feet. What will be its dimensions?

155. John's money is to Joseph's as 6 to 7, and Joseph has 28 cents more than John. How much has each?

156. How many bricks will be required to build a solid circular tower, 150 feet high, 25 feet in diameter at the base, and 5 feet at the top, the bricks being 8 inches long, 4 inches wide, and 2 inches thick?

157. How many feet of surface on a rectangular stone 7 feet long, 3 feet 4 inches wide, and 2 feet 3 inches thick?

158. If I purchase, in Boston, $24\frac{1}{2}$ yards of cloth at 5s. 3d. per yard, and hand the clerk 3 ten dollar bills, how much change shall I receive back?

159. A man has a garden 8 rods long and 6 rods wide, in the centre of which stands a perpendicular post 36 feet high. What is the distance from the foot of the post to the corner of the garden? What is the distance from the top to each corner? What is the distance from the top of the post to the middle of each side, and to the middle of each end?

160. A, B, and C trade in company. A clears \$13 in 6 months; B, \$18 in 5 months; and C, \$23 in 9 months, his capital being \$72.50. What is the whole capital?

161. If a triangular piece of land containing 3 acres measures 20 rods on one side, what must the corresponding side of a similar triangle measure, that it may contain 108 acres?

162. What number is that from which, if 5 be subtracted, $\frac{2}{3}$ of the remainder will be 40?

163. A merchant shipped 3000 bushels of potatoes from Boston to New Orleans, October 1, 1851. He paid $62\frac{1}{2}$ cents per bushel, \$350 freight, and \$35 insurance. His factor sold them at \$1 per bushel, and charged him 7 per cent. commission, and remitted the balance January 25, 1852. What was his gain, allowing 6 per cent. interest?

164. If my plough cuts a furrow 15 inches wide, how far must my team walk to plough an acre?

165. How many hogsheads of water will a cistern, 10 feet long, 8 feet wide, and 6 feet deep, hold?

166. What is the amount of \$652.50 for 2 years, 5 months, 18 days, at $7\frac{1}{2}$ per cent.?

167. John Green has a square field, containing 50 acres; James Hall has another, the length of which is twice the breadth, of which the diagonal is equal to a side of Green's. What is the size of Hall's field?

168. A man divided a cord of wood so that one part contained $\frac{5}{11}$ as much as the other. How much did each part contain?

169. How many hills of potatoes can I plant on a square acre, the rows and hills being 3 feet apart?

170. A man wishes to make a rectangular box that shall contain 512 cubic feet, the width to be twice the height, and the length to be twice the width. What will be the dimensions of the box? and how many feet of boards, 1 inch thick, will it require to make it?

171. If a globe, 4 feet in diameter, weighs 620 pounds, what is the weight of another, of the same material, 6 feet in diameter?

172. A board, 32 feet long, is 22 inches wide at one end and 11 inches at the other. At what distance from the wide end must it be cut off to be divided into two equal parts?

173. I sell 4620 bricks at \$7 per M., and take, in payment, boards at \$11 per M. How many feet do I receive?

174. A certain field is 42 chains long and 63 rods wide. How many acres does it contain?

175. What is the surface of a globe 130 inches in circumference?

176. In a circular field 160 rods in diameter, how many acres?

177. John Smith has cloth which he sells for \$2.50 per yard, cash; and William Wilson has flour which he sells for \$5.75, cash. Now if, in bartering, Smith charges Wilson \$2.87 $\frac{1}{2}$ for cloth, what should Wilson charge Smith for flour?

178. A teacher, being asked how many pupils he had, answered: "My class in grammar comprises $\frac{1}{4}$ of my school; my class in arithmetic, $\frac{1}{4}$; my class in algebra, $\frac{1}{4}$; my class in geography, $\frac{1}{4}$; and my class in philosophy, 18; and each scholar is in 2 classes." How many pupils had he?

179. What cost 47 ells French of lace, at 62 $\frac{1}{2}$ cents per yard?

180. A, B, C, and D, bought a house together, for \$16,500. B paid twice as much as A; C paid as much as A and B; and D paid as much as B and C. How much did each pay?

181. If from 60 and 75 respectively a certain number be subtracted, $\frac{1}{4}$ of the first remainder will be equal to $\frac{1}{11}$ of the last. What is the number subtracted?

182. The length of a field exceeds its width by 8 rods. If 240 square rods were added to the side, it would be square. What is the size of the field?

183. Divide the number 128 into 3 such parts that $\frac{1}{4}$ of the first will be equal to the second, and $\frac{1}{4}$ of the second will be equal to the third.

184. What is the interest of \$3674.50 for 3 years, 7 months, 16 days, at $4\frac{1}{2}$ per cent. ? *Ans.* \$599.862+.

185. What will be the cost, at $4\frac{1}{2}$ cents per yard, of plastering a room 20 feet 6 inches by 16 feet 4 inches, and 10 feet high, the mop-board being 1 foot wide, 2 doors 5 by 8 feet each, and 4 windows each 6 feet 4 inches by 4 feet 6 inches ?

186. If I buy \$20,000 worth of goods, $\frac{1}{4}$ on a credit of 2 months, $\frac{1}{4}$ on 4 months, $\frac{1}{4}$ on 6 months, and the remaining $\frac{1}{4}$ on 8 months, how much ready money ought I to pay for them, money being worth 6 per cent. ?

187. In the last example, by the principles of equation of payments, what credit should I have on the whole ?

188. What is the present worth of \$20,000, due at the end of 5 months ?

189. If I buy goods for \$20 and sell them for \$25, what per cent. do I gain ?

190. If $\frac{7}{8}$ of a cord of wood cost \$2.10, what will a cord cost ?

191. Six men start from the same place and travel in a circle. The first goes round in six hours; the 2d goes round in 9 hours; the 3d, in 10 hours; the 4th, in 16 hours; the 5th, in 12 hours; and the 6th, in 18 hours. In how long a time will they all meet at the point from which they started ?

192. I paid at the rate of \$4 $\frac{1}{4}$ per ell English for

broadcloth. For what must I sell it per yard to gain 10 per cent. ?

193. How long must a bin be made, which is 6 feet wide and 4 feet high, to contain 500 bushels ?

194. The diagonal of a square field is 120 rods. How many acres in the field ?

195. A man divided 500 pounds of beef between 3 men, giving the second $\frac{1}{2}$ of what he gave the first, and the third $\frac{1}{3}$ of what he gave the second. How much had each ?

196. A gentleman, who in his youth neglected his arithmetic, bequeathed to his five daughters \$10,000. To the first he gave $\frac{1}{2}$ of it; to the second $\frac{1}{3}$; to the third $\frac{1}{4}$; to the fourth $\frac{1}{5}$; and to the fifth \$3000. How much should each receive ?

197. The sides of a triangular field measure 100, 120, and 130 rods respectively. What is its area ?

198. An officer pursues a thief, who has 40 miles the start, at the rate of 12 miles in 70 minutes. The thief flees at the rate of 15 miles in 90 minutes. How long will it take the officer to come up with him ?

199. At 5s. 4d. per pound, in New York, what cost 600 pounds of tea ?

200. If $3\frac{1}{2}$ pounds of tea cost \$1 $\frac{1}{2}$, what will $5\frac{1}{2}$ pounds cost ?

201. If I buy eggs at the rate of 12 for 15 cents, and sell them at the rate of 14 for 18 cents, how many dozen must I sell to gain \$25?

202. James Gale sold a stock of goods to William Lindsey for \$5000, payable in one year, without interest. At the end of 3 months he received \$1500; at the end of 6 months, \$1500 more; at the end of 8 months, \$1000. What will be due at the end of the year, money being worth 6 per cent.?

203. A bin is 8 feet long, and 4 feet high. How wide must it be made to hold 300 bushels?

204. When butter is worth \$30 $\frac{1}{4}$ per cwt. what is the value of 16 $\frac{3}{4}$ pounds?

205. If 24 printers, in 6 days, working 8 hours per day, compose 4 books of 1000 pages each, each page containing 100 lines, each line 16 words, and the words averaging 8 letters, in how many days of 12 hours each will 15 printers compose 12 books of 400 pages each, each page containing 72 lines, each line 12 words, and the words averaging 6 letters?

206. How many square feet of surface in a globe 50 feet in diameter?

207. From the wide end of a plank, 25 feet long, 26 inches wide at one end, and 14 inches at the other, how many feet in length must be taken to make 20 square feet?

208. If a load of wood 7 feet 5 inches long, 3 feet 7 inches wide, and 3 feet 3 inches high is worth \$3.50, what is the value of a load of twice these dimensions?

209. One third of two pence is what part of 3 half pence?

210. Among how many men can $\frac{1}{4}$ of a dollar be divided, giving each $\frac{1}{8}$ of a dollar? and what will be the remainder?

211. A school-house, which cost \$500, is to be paid for by 4 men, A, B, C, and D. Their portions are to be in the inverse ratio of their distances from it. A lives $\frac{1}{4}$ of a mile from it; B, $\frac{1}{2}$ a mile; C, $\frac{3}{4}$ of a mile; D, 1 mile. What must each pay?

212. A cistern, containing 250 gallons, has a pipe which brings in 9 gallons in 8 minutes, and another pipe which carries off 6 gallons in 5 minutes. Now if, when the cistern is full, both pipes be opened, how long will it be before the cistern will be emptied?

213. A cistern is 8 feet long and 6 feet wide at the bottom, and 6 feet long and $4\frac{1}{2}$ feet wide at the top, and 6 feet high. How many hogsheads of water will it contain?

214. A scythe-maker sold $\frac{1}{3}$ of the scythes he had made during the year to Walter Allen, $\frac{1}{4}$ of the remainder

to Samuel Hall, $\frac{1}{3}$ of the rest to John Chase, and then had 160 dozen left. How many had he made?

215. A man invested \$10,000, which was all his property, in a speculation, and lost 20 per cent. He then invested all his property in another speculation, and gained 30 per cent. What was his gain by both? and what per cent.?

216. Three travellers dine together. A furnishes 5 loaves and B 3; but C, having none, agrees to pay 24 cents for his dinner. How must A and B divide the money?

217. A man wishes to enclose, with a fence 5 rails high, the rails being 8 feet 3 inches long, a square of such a size that the number of square rods in the field shall be equal to the number of rails required. How many acres will the field contain?

218. A's note for \$184.75 was given January 7, 1850. What was due on it May 20, 1852, at 6 per cent.?

219. A clerk in New York sold $12\frac{1}{2}$ yards of lace at 7s. 6d. per yard, and received a 20 dollar bill. What was the exact change due the purchaser?

220. What is the area of a circle 25 feet in diameter?

221. What salary must a man have, that he may lay out 40 per cent. of it for his family, pay debts with $\frac{1}{3}$ of the remainder, and deposit \$360 per annum in the savings bank?

222. A said to B, "Give me \$10, and I shall have as much money as you." "And you," said B, "give me \$8, and I shall have twice as much as you." How much had each?

223. A man divides \$3600 between his two sons. The share of the youngest is $\frac{7}{11}$ of the share of the eldest. What is the share of each?

224. The diameter of a given circle is 14 inches. What is the diameter of one 9 times as large?

225. The diameter of a sphere is 13 inches. What is the circumference of one 8 times as large?

226. Five men can do a piece of work in 20 days, and 3 women can do the same work in 50 days. How long will it take one man and one woman to do the same work?

227. What part of 5s. is $\frac{3}{4}$ of 9d.?

228. A man, going a journey of 344 miles, finds, at the end of 4 days, that the distance he has travelled is equal to $\frac{1}{4}$ of the remaining distance. How many miles does he travel per day?

229. The circumference of a circle is 84 inches. What is the circumference of a circle $\frac{1}{4}$ as large?

230. How many bricks, 8 inches long, 4 inches wide, and 2 inches thick, will be required to encase a cistern 20 feet long, 10 feet wide, and 5 feet deep, the casing being one foot thick?

231. A house is 36 feet long and 28 feet wide; the ridge is 10 feet above the beam, and the roof projects one foot over the ends and eaves. How many boards will be required to cover the roof?

232. How many bushels of corn, at 4s. 6d. per bushel, can be bought in Providence for \$45.50?

233. At \$5.50 per cord, what is the value of a load of wood 8 feet long, 5 feet 4 inches high, and 4 feet 6 inches wide?

234. How many feet of square-edged boards, of equal width, one inch thick, can be sawn from a log 24 feet long and 2 feet in diameter, allowing $\frac{1}{4}$ of an inch for the saw-cut?

235. How many solid feet in a globe 100 feet in diameter?

236. A note was given, June 10, 1845, for \$1245, on which were the following endorsements: May 10, 1846, \$120; Sept. 22, 1846; \$10; June 10, 1847, \$25; Jan. 22, 1848, \$160; Sept. 10, 1849, \$140. What was due Jan. 10, 1850, at 6 per cent.?

237. If a pyramid 20 feet high contains 4600 cubic feet, what is the solidity of a similar pyramid 100 feet high?

238. What part of $13\frac{1}{2}$ gallons is 3 gallons, $2\frac{1}{2}$ quarts?

239. A sold 10 hogsheads of wine to B, and gained 5 per cent.; B sold the same to C, and gained 10 per

cent.; C sold the same to D for \$392.931, and gained 8 per cent. What did it cost A per gallon?

240. How much paper will be required to print 500 copies of an octavo book, containing 336 pages, there being 2 quires of waste paper in each ream?

241. If a cannon ball were to fly with a constant velocity of 1800 feet per second, in what time would it reach the sun from the earth, the distance being 95,000,000 miles, allowing 365 days, 6 hours, to the year?

242. A person, making his will, gave one child $\frac{1}{3}$ of his property, and to the other the remainder. On settling the estate, the difference between the two legacies was found to be \$600. What was the whole estate?

243. What cost 2400 yds. of lace, at 5s. 4d. per yd., in New York?

244. What is the value of a note for \$650, due 3 years hence, money being worth 6 per cent. compound interest?

245. A regiment of soldiers, consisting of 976 men, is to be furnished with coats, each to contain $2\frac{1}{2}$ yds. $1\frac{1}{2}$ yards wide. How many yards of cotton $\frac{7}{8}$ yd. wide will line them?

246. If 248 men, in 5 days of 11 hours each, dig a trench 230 yards long, 3 wide, and 2 deep, in how many

days of 9 hours each will 24 men dig a trench 420 yards long, 5 wide, and 3 deep?

247. A cone is 36 feet high, and contains 1650 cubic feet. What is the diameter of the base?

248. By selling my horse for \$150, I lose 15 per cent. What per cent. should I gain by selling him for \$200?

249. A and B laid out equal sums in trade; A gained a sum equal to $\frac{1}{4}$ of his stock, and B lost \$225; then A's money was double B's. What did each lay out?

250. A man bought a farm for \$5000, and sold it, after keeping it 2 months, at 3 per cent. advance, when money was worth 8 per cent. What was his gain?

251. A man paid $\frac{1}{6}$ of his money for board, $\frac{1}{3}$ for clothing, $\frac{1}{4}$ for horse-hire, and $\frac{1}{4}$ for a house lot, when he found he had \$325 left. How much money had he at first?

252. What cost 650 bushels of potatoes, at 2s. 6d. per bushel, in New England?

253. If the base of a pile of cannon balls contains 144 balls, what is the greatest number the pile can contain?

254. A ship is found to displace 48000 cubic feet of salt water, the specific gravity of which is 1026. What is the weight of the ship?

255. The convex surface of a cone contains 1200 square feet, and the diameter of its base is $14\frac{1}{2}$ feet. What is its slant height?

256. The area of a circle is 50.2656 feet. What is its diameter?

257. A man having a garden $22\frac{1}{4}$ rods long, and $12\frac{6}{7}$ rods wide, sells $\frac{2}{3}$ of it for \$75. What is the value of $\frac{1}{3}$ of the remainder, at the same rate?

258. A merchant bought a hogshead of oil for \$72, and sold $\frac{1}{3}$ of it to Samuel Jones, and $\frac{2}{3}$ of the remainder to John Earl, and $\frac{1}{3}$ of what then remained to Horace Scott. What is the value of the remainder?

259. Bought 17 tons, 14 cwt., 3 qrs., 21 lbs. of steel, at $7\frac{1}{2}$ cents per pound, and afterwards sold 11 tons, 3 cwt., 2 qrs., 12 lbs., at 8 cents per pound. What is the value of the remainder at \$12 per cwt.?

260. How many quarts of water will a tub hold, 22 inches in diameter at the bottom, 26 in. at the top, and 20 in. deep?

261. What must be the thickness of a bomb-shell, one foot in diameter, that it may weigh 50 lbs., the specific gravity of the iron being 7248?

262. If a rope 6 inches in circumference consists of 450 threads, how many such threads will be required to make a rope 14 inches in circumference?

263. If a body weighs 28 lbs. on the surface of the earth, what will be its weight 100 miles above the surface, weight being in the inverse ratio of the square of the distance from the centre of the earth, and the diameter of the earth being 7964 miles?

264. A merchant bought 5 boxes of sugar, each weighing 5 cwt., 2 qrs., and 21 lbs., at \$5 per cwt. gross. The draft is 4 lbs. per box, and the tare 16 lbs. per cwt. What did it cost him per cwt. net?

265. A man borrowed 2£, 10s. 9d., and agreed to pay 2£, 10s. 9d. for each £ borrowed. How much did he pay?

266. What is the length of a wall, 4 ft. thick and 6 ft. high, which, being paid for at the rate of \$2.50 per cubic yard, cost \$400?

267. A landlord, being asked what rent he received, said: "After deducting 6 per cent. for taxes, and 8 per cent. of the remainder for repairs, I have remaining \$432.40." What did he receive?

268. Bought 20 barrels of flour for 5 times as many dollars, and sold them for 6 times as many. If they had cost me as much as I sold them for, what should I have sold them for to have gained at the same rate?

269. If a stick of timber is 40 ft. long and 22 inches in diameter, how many cubic feet will it contain, when hewn square?

270. If a pipe, whose diameter is $1\frac{1}{2}$ inches, will fill a cistern in 5 hours, in what time will a pipe whose diameter is $3\frac{1}{2}$ inches fill the same cistern?

271. The Connecticut river is 1000 ft. broad, 12 ft. deep, and runs at the rate of $3\frac{1}{2}$ miles per hour. In what time will it discharge a cubic mile of water?

272. A man and his wife used a bag of flour in 12 days, but when the man was absent it lasted the woman 30 days. How long would it last the man alone?

273. What cost $36\frac{1}{2}$ yds. flannel, at 2s. 6d. per yard, in Boston?

274. A carpenter sold a house for \$6200, which was 4 per cent. less than it cost him to build it. What did he lose?

275. A man willed \$1000 to his 4 sons, as follows: to the first $\frac{1}{4}$ of it, to the second $\frac{1}{3}$ of it, to the third $\frac{1}{4}$ of it, and to the fourth \$400. What will be the share of each?

276. What is the interest of £250, 7s. 6d. for 2 y. 7 m. 24 d., at $7\frac{1}{2}$ per cent.?

277. In a certain book there are 720 pages, 70 lines on a page, the lines being $5\frac{1}{4}$ inches long. How many miles of lines in the book?

278. In the same book there are, on the average, 85 letters and points in a line, and the compositor's hand moves, on the average, $2\frac{1}{2}$ feet in setting each type. How far must his hand travel in setting up the book?

279. A farmer carries 28 pounds of butter to a store in Woonsocket, R. I., and sells it at one shilling per lb. he receives 12 gals. of molasses at 1s. 9d. per gal., and 2 lbs. of nails at $6\frac{1}{4}$ cents per pound, and the remainder in cash. How much cash does he receive?

280. How long a ditch, 4 ft. wide and $2\frac{1}{2}$ ft. deep, will 15 men dig in 30 days, of 10 hours each; if 25 men dig one 40 rods long, 5 ft. wide, and 3 ft. deep, in 20 days of 12 hours each?

281. A and B can build a piece of wall in 12 days, and, with the assistance of C, they can do it in 9 days. How long will it take C alone to build it?

282. At \$18 per ton, what will 6 tons, 15 cwt., 3 qrs. 24 lbs., 10 oz. of hay come to?

283. A man bought $\frac{1}{2}$ of a ton of iron at one time, $\frac{1}{4}$ of a cwt. at another, $\frac{1}{8}$ of a qr. at another, $\frac{1}{16}$ of a pound at another. How much did he buy in all?

284. A ship sailed from port, south 150 miles, then east 70 miles; afterwards she sailed south 80 miles, and then east 120 miles. How far was the ship from port then?

285. Bought a hhd. of molasses containing 126 galls., at $27\frac{7}{8}$ cents per gal.; $25\frac{1}{4}$ gals. having leaked out, how shall I sell the remainder per gallon, so as to lose 7 per cent.?

286. A log 25 feet long, is 37 inches in diameter at one end, and 20 inches at the other. How many cubic feet does it contain?

287. A man has two kinds of cloth, the first worth \$1.50 per yard more than the other. 10 yards of the second are worth as much as 7 of the first. What is the value of each per yd.?

288. What number is that from which if you take $\frac{2}{3}$ of itself, the remainder will be 30?

289. A and B engaged in trade with equal sums of money; A gained a sum equal to $\frac{1}{3}$ of his stock, and B lost \$420, when B had $\frac{1}{2}$ as much as A. What was the stock of each at first?

290. William Adams bought the following bills of goods, on credit, as specified:

July	5, 1851,	\$2000	on	6	months.
Aug.	10, "	1400	"	3	"
Oct.	15, "	1200	"	5	"
Nov.	20, "	1500	"	6	"
Jan.	10, 1852,	1000	"	4	"

What will be the equated time for the payment of the whole?

291. A has travelled 81 miles, when B sets out after him; B travels 24 miles to A 15. How many miles will they each have travelled when B overtakes A?

292. Bought 50 pieces of cloth, each containing 34 ells Flemish, at 8s. 4d. per ell English. What did it cost?

293. What number is that which, being increased by its half, its fourth, and 18, will be doubled?

294. If 12 horses eat 30 bushels of oats in a week, how many bushels will serve 45 horses the same time?

295. A man bought a hhd. of molasses, and, $\frac{1}{4}$ of it having leaked out, sold the remainder at 36 cents per gallon, and thereby gained $6\frac{1}{2}$ per cent. on the whole cost. What did he pay per gallon?

296. The head of a fish is 6 in. long; his tail is as long as his head and $\frac{1}{2}$ the body, and the body is as long as the head and tail together. What is the length of the fish?

297. What is the length of the diagonal of a cubical room, the side of which is 20 feet?

298. What fraction is that from which if you take $\frac{1}{2}$ of itself, the remainder will be $\frac{1}{4}$?

299. A and B have the same income; A saves $\frac{1}{10}$ of his, and B, by spending \$20 per year more than A, finds

himself \$50 in debt at the end of ten years. What is the income of each?

300. Bought a hhd. of molasses, containing 126 gals., for a certain sum. $25\frac{1}{3}$ gals. having leaked out, I sell the remainder at $32\frac{1}{4}$ cents per gallon, and, by so doing, lose 7 per cent. What did it cost me per gal.?

301. A man bought some cows, sheep, and lambs, for \$480. For the cows he gave \$20 each, the sheep \$5, and the lambs \$3. He bought twice as many sheep as cows, and three times as many lambs as sheep. How many of each did he buy?

302. If 12 men can build a wall in 20 days, how many men can do the same in 8 days?

303. How many yards of prints, at 6d. per yd., can I buy, in Boston, for \$25.37 $\frac{1}{2}$?

304. James and John have together 315 cents, and James has $\frac{3}{5}$ as many as John. How many has each?

305. What is the weight of a globe of granite 10 ft. in diameter, its specific gravity being 2662?

306. If 1000 apples are placed in a row, one rod apart, how many miles must a man travel to pick them up, one by one, and deposit them in a basket placed one rod from the first?

307. In a cast-iron water pipe, 12 ft. long, 8 in. in diameter, and $\frac{1}{4}$ in. thick, how many cubic in. of iron?

308. Bought a cask of oil, containing, as I supposed, 210 gallons, but afterwards found it to fall short 12 gals. I sold it, however, at \$1.40 per gallon, and still gained 10 per cent. What did I pay per gallon?

309. What is the side of a cubical pile of wood that contains 122 cords and 9 cubic feet?

310. Three persons are to divide \$1776 between them in the proportion of 1, $\frac{1}{2}$, and $\frac{2}{3}$. What will be the share of each?

311. Six persons agree to board together as long as they can arrange themselves at table, so as not to sit twice in the same order. If they eat 3 meals per day, how long will they board together?

312. Two travellers start on a journey, with the same money. When one had spent \$10, and the other \$15, $\frac{1}{4}$ of what the first had left was equal to $\frac{1}{3}$ of what the second had left. What had they each at first?

313. The cube of 4.5 is the square of what number?

314. On a debt of \$1000, due in 10 months, \$300 is paid in 3 months, and \$200 in 4 months. In how many months should the remainder be paid?

315. A ladder, standing upright against a house, reaches to the top; but, the foot being placed 22 feet from the wall, it reaches a point half way from the bottom to the top. How high is the house?

316. The slant height of a pyramid is 42 feet, and its base 24 feet square. How many cubic feet does it contain?

— **317.** A man bought a piece of cloth for \$150, and sold $\frac{1}{2}$ of it at an advance of 10 per cent.; $\frac{1}{4}$ at an advance of 12 per cent.; $\frac{1}{4}$ at a loss of 6 per cent. How must he sell the remainder that he may neither gain nor lose by the whole transaction?

— **318.** A, B, and C trade together. A puts in \$1000 for 10 months; B, \$800 for 12 months; C, \$900 for 14 months. They gain \$1200. What is the share of each?

— **319.** If 18 yds. of broadcloth cost \$72.36, what is the cost of 28 ells French?

— **320.** How much wood in a load 8 ft. long, 6 ft. 3 in. high, 5 ft. 4 in. wide?

321. A block of Penn. marble is 6 ft. wide and 3 ft. thick, and weighs 51 tons, 3 cwt., 2 qrs., and 20 pounds. What is its length, its specific gravity being 2720?

322. The solidity of the frustum of a cone is 3612 cubic feet. The area of the lower base is 64 feet, and that of the upper, 25 feet. What is its altitude?

323. What is the diameter of a globe, the solidity of which is 523.6 cubic feet?

324. What is the amount of 560£, 7s. 6d. for 2 years, 6 months, at $7\frac{1}{2}$ per cent. ?

325. A owes B \$25000 to be paid down, and \$25000 to be paid in six years, and proposes to pay the whole in three years, which B declines. Does A gain or lose by his refusal ? and how much, money being worth 6 per cent. ?

326. At 2s. 8d. per yd., what will 542 yds. of silk cost in Boston ?

327. A merchant bought a quantity of flour for \$2000. For how much must he sell it on a credit of 6 months, so as to gain 7 per cent., when money is worth 6 per cent. ?

328. A cistern has 3 pipes. The first and second together will fill it in 12 hours ; the second and third, in 20 hours ; the first and third, in 15 hours. In how many hours will all together fill it ? How long will it take each alone ?

329. If 10 tons gross of sugar cost \$1000, and the draft is 5 per cent., and the tare 6 per cent., for how much per lb. net must it be sold to gain 10 per cent. ?

330. How many changes can be rung on the 8 bells of Christ's Church, in Boston ?

331. How much wine, at 4s. 6d. and at 5s. per gal., must be mixed with 6 gals. at 4s., and 6 gals. at 3s. per gallon, that the mixture may be worth 4s. 4d. per gallon ?

— **332.** How shall 10952 men be placed that the number in rank may be double the number in file?

333. A merchant from New York, being in Cuba, where the value of silver was to that of gold as 1 to $15\frac{1}{6}$, exchanged $175\frac{1}{2}$ lbs. of silver for gold. On returning to New York, where the value of silver was to that of gold as 2 to $30\frac{1}{4}$, he exchanged his gold for silver. What weight of silver did he gain?

334. How far are the inhabitants of the forty-third parallel of latitude carried by the diurnal revolution of the earth in a minute, the degree of longitude there being 51 miles?

335. A man bought 25 yds. of linen in arithmetical progression. For the fourth yard he gave 12 cents, and for the last 75 cents. What did the whole amount to? What did it average per yard?

336. A walk, of the uniform breadth of 2 rods, surrounding a public square, contains just one acre. What is the side of the enclosed square?

337. A field, in the form of a rightangled triangle, contains $6\frac{3}{4}$ acres; the base is double the perpendicular. What is the length of the perpendicular?

338. What is the capacity, in wine gallons, of a hollow globe, the internal diameter of which is 56 inches?

— **339.** How many rods of fence will be required to enclose a square field of one acre? How many to enclose one of 4 acres?

—**340.** How many bricks will be required to enclose a rectangular garden, 6 rods wide, containing $\frac{3}{4}$ of an acre, with a wall 6 ft. 2 in. high, and 1 ft. thick, allowing two gateways, 6 ft. wide each, the bricks being 8 in. long, 4 in. wide, and 2 in. thick?

341. A rod of cast-steel, one inch square, will sustain a weight of 134256 lbs. What length of the rod will sustain its own weight, its specific gravity being 7833?

342. The solidity of a cylinder is 128 feet; and its height is 12 feet. What is the diameter of the base?

343. A hare is 50 of his own leaps before a hound, and makes 4 leaps to the hound's 3; but 2 of the hound's leaps are equal to 3 of the hare's. How many leaps must the hound take to catch the hare?

—**344.** If $\frac{1}{4}$ of a hhd. of oil is worth \$45, what will be the value of $\frac{3}{4}$ of the remainder?

—**345.** What is the amount of \$2486.50 for 1 y. 3 m. 14 d., at 7 per cent.?

346. A trapezoid has its parallel sides 30 and 42 chains, and the distance between its parallel sides is 53 rods. How many acres does it contain?

347. What is the surface of a globe 16 inches in diameter?

—**348.** A man sold a quantity of wheat at \$1.08 per bushel, and gained 20 per cent.; afterwards he sold some

of the same for \$31.05, and gained 50 per cent. How many bushels did he sell in the last parcel?

— **349.** If, in selling goods for \$165, I gain 120 per cent., what did the goods cost me?

350. If a cistern contains 65 hhds., wine measure, how much will it contain beer measure?

— **351.** A trader, having a quantity of cotton cloth, sold $\frac{1}{2}$ of it to one man, $\frac{2}{3}$ of the remainder to another, $\frac{1}{3}$ of what then remained to another, and the rest to a fourth, which was 120 yds. How much had he at first?

352. A house was leased for 7 years, at \$400 per an., and the rent was unpaid during the whole time. What sum was due at the end of the lease, 6 per cent. simple interest being allowed?

— **353.** If $\frac{3}{4}$ of a ton of iron cost \$26, what will $\frac{1}{8}$ of a cwt. cost?

354. Bought 40 acres of land at \$25 per acre, and, having kept it 10 years, sold it at 4 cents per foot, having given a piece 40 rods long and 6 rods wide for a street. What is my gain, allowing 6 per cent. compound interest?

355. Bought 720 $\frac{1}{2}$ ells English of broadcloth, at \$2.80 per ell, and paid \$20 freight, and 30 per cent. ad valorem duties. For what per yard must I sell it to gain 20 per cent.?

356. How large a cube can I cut from a globe 20 inches in diameter?

— **357.** Sold a note for \$7.50, and lost 85 per cent. What was the par value of the note?

358. A stone was put into a cylindrical vessel 21 in. in diameter, partly filled with water, when it was observed that the water rose 4 in. How many cubic inches in the stone?

— **359.** In a piece of land, $148\frac{3}{4}$ rods long, and $84\frac{1}{2}$ rods wide, how many acres?

360. The sides of the base of a triangular prism are 10, 8, and 6 feet, and the length is 20 feet. How many solid feet does it contain?

361. What is the compound interest of \$2642.25 for 5 years, at 6 per cent.?

362. What is the weight of a wrought-iron shaft, 30 feet long, and 6 inches in diameter, its specific gravity being 7788?

— **363.** If 63 men can build a wall, $45\frac{1}{2}$ ft. long, $6\frac{1}{2}$ ft. high, and $3\frac{1}{2}$ ft. thick, in 34 days of $11\frac{1}{2}$ hours each; in how many days of $8\frac{1}{2}$ hours each will 21 men build a wall, $98\frac{1}{2}$ yards long, $2\frac{1}{2}$ yards high, and $1\frac{1}{2}$ yards thick?

— **364.** Three gardeners, A, B, and C, having bought a piece of land, find the profits amount to \$512 per an. As often as A paid \$5 B paid \$7, and as often as B paid

\$4 C paid \$6. How much should each receive of the annual gain?

— **365.** A farmer sold a span of horses to a jockey, and the jockey sold them for \$45 more than he paid for them, and thereby gained 15 per cent. What did the jockey pay for them?

366. Bought potatoes in New Hampshire at 45 cents per bushel, allowing 50 lbs. to the bushel, and sold them in Rhode Island at 90 cents per bushel, allowing 60 lbs. to the bushel. What is my gain per cent., I having paid 34 cents per 100 lbs. freight?

367. How many bricks, 8 in. long, 4 in. wide, and 2 in. thick, will be required for a wall, 8 ft. high, 2 ft. thick, enclosing a circular plat 10 ft. in diameter?

368. Sold a piece of cloth, containing 1000 ells Flemish, for 850 guineas, and gained on each yd. $\frac{1}{8}$ the prime cost of an ell English. What was the cost of the whole piece?

— **369.** What is the cost of a box of sugar, containing 432 $\frac{1}{2}$ pounds, at 7 $\frac{1}{2}$ cents per pound?

— **370.** If 540 tiles, each 12 inches square, will pave the floor of a certain building, how many will the same floor require when the tiles are 10 in. long and 8 inches wide?

371. A can do a piece of work in 3 weeks; B can do 3 times as much in 8 weeks; and C can do 5 times

as much in 12 weeks. In how long a time will they all together finish the work ?

372. A merchant has sugars, for which he paid 6 cents, 7 cents, 8 cents, and 9 cents, of which he wishes to make a mixture of 500 pounds, which he can sell for 9 cents, and gain 15 per cent. How many lbs. of each may he take ?

373. How many lbs. of butter, at 1s. 6d. per lb., can I buy in New York for \$22.50 ?

374. If a fire engine throws the water, from an inch pipe, at the rate of 75 feet per second, how many hogsheads of water will it throw in an hour ?

375. One qr. 14 lbs. to the ton, is what per cent. ?

376. A person left 100£ to be distributed among 3 poor persons, so that the shares of the eldest, the middle-aged one, and the youngest, should be in the proportion of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$. How much did each receive ?

377. What is the least number that can be divided by each of the nine digits without a remainder ?

378. A stationer sold quills at 11s. per M., by which he cleared $\frac{1}{3}$ of his money. He afterwards raised the price to 13s. 6d. per M. What per cent. did he clear by the latter price ?

— **379.** A, B, and C, are to share \$100,000 in the proportion of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$, respectively; but, C having died, it is required to divide the whole sum properly between the other two. How much will each receive?

— **380.** If, by selling goods at 2s. 3d. per lb., I gain 100 per cent., what shall I clear by selling them at 9 guineas per cwt. ? *210 = 1 guinea.*

— **381.** How many strokes do the Venetian clocks, which go on to 24 o'clock, strike per day?

— **382.** If I sell flour for \$100, and gain $12\frac{1}{2}$ per cent., what did it cost me?

— **383.** A man bought 250 ells English of broadcloth, at \$2.50 per ell, and sold it at \$2.37 $\frac{1}{2}$ per yd. What did he gain?

— **384.** How much wood in a load 4 feet long, 5 feet 2 inches wide, and 5 feet 3 inches high?

— **385.** James Adams' note for \$1200, to be paid in one year, without interest, was given Jan. 10th, 1852. May 10th, 1852, he paid \$200; June 15th, 1852, he paid \$300; July 10th, 1852, he paid \$200. When should the remainder be paid?

386. In a storm, there fell 4 inches of rain. How many hogsheads of rain fell on an acre ? *221 ch. 2 gal.*

387. If a pound Avoirdupois of gold is worth \$200, what is the value of a globe of gold, one foot in diameter, its specific gravity being 17350 ?

388. John Corey sold a farm to Adin Capron, and gained 20 per cent. ; Adin Capron sold it to Austin Scott and gained 10 per cent. ; Austin Scott sold it to William Gill for \$1254, and lost 5 per cent. What did it cost John Corey ?

389. A gentleman wishes to set out an orchard of 864 trees, so that the length shall be to the breadth as 3 to 2. How many rows of trees, and how many trees in a row, will there be ?

390. If a legacy of \$2000 be left to me, — \$500 payable in 6 months, \$800 in 1 year, and the rest at the end of 3 years, — and the executor be willing to make present payment of the whole, discounting at the rate of 6 per cent., what ought I to receive ?

391. How many boards will be required to cover a barn 50 feet long, and 30 feet wide ; the height of the gable ends being 13 feet, and the rafters 20 feet long, and the posts being 15 feet high ?

392. A merchant mixed 95 gals. of wine worth 8s per gal., with wine worth 5s. 6d. per gal., and found that the mixture cost him 6s. 9d. per gal. How many gals. of that worth 5s. 6d. did he use ?

393. From a cask of oil 20 gallons were drawn ; after which $\frac{1}{3}$ of the remainder leaked out ; and then it

was found to be 10 gals. more than $\frac{1}{2}$ full. How many gals. in the cask at first?

—**394.** At 7s. per yd., what cost 648 yds. silk in New York?

—**395.** My cellar is 26 feet long, 18 ft. wide, and 7 ft. deep. I wish to make it 28 ft. long, 21 ft. wide, and 8 ft. deep. How much earth must I remove?

396. Divide \$435 between 3 men, so that $\frac{1}{2}$ of the share of the first shall be equal to $\frac{2}{3}$ the share of the second, and to $\frac{3}{4}$ the share of the third.

—**397.** Bought a hhd. of molasses, containing 126 gals., for \$35, and, $25\frac{1}{2}$ gallons having leaked out, I sold the remainder at $32\frac{1}{2}$ cents per gal. What did I lose per cent.?

—**398.** If 10 oranges are equal in value to 15 lemons, and 6 lemons to 3 lbs. of sugar, and 18 lbs. of sugar to 5 lbs. of tea, and 12 lbs. of tea to 35 lbs. of coffee, and 7 lbs. of coffee to 14 lbs. of cheese, how many oranges are equal in value to 100 pounds of cheese?

399. What number is that, which is 109 greater than the next square number below it, and 124 less than the next square number above it?

400. Adam Jones has 600 lbs. of tea, which he sells at 50 cents cash per lb. John Swain has 400 lbs. of chocolate, which he sells at $62\frac{1}{2}$ cents per lb. cash. Now, Jones sells his tea to Swain at $62\frac{1}{2}$ cents per pound, and

takes Swain's chocolate, and the remainder in cash. What should Swain charge him for his chocolate?

(401. A young man received \$210, which was $\frac{2}{3}$ of his elder brother's portion; and 3 times his elder brother's portion was $\frac{1}{2}$ the father's estate. What was the value of the father's estate?

— 402. If from 3 times a certain number 28 be subtracted, the remainder will be 80. What is the number?

— 403. A man bought cloth for 8 per cent. less than its value, and sold it for 10 per cent. more than its value, and gained $88\frac{1}{3}$ cents. What did it cost him?

— 404. I receive \$2000 from my employer, with which, after deducting my commission of $4\frac{1}{2}$ per cent., to purchase wool. How much can I buy at $33\frac{1}{2}$ cents per pound?

405. What will be the expense of insuring a cotton factory for \$50,000, at $2\frac{1}{2}$ per cent.?

— 406. A speculator bought a farm for \$4600 cash, and sold the same immediately for \$5500, payable in one year and 6 months. What did he gain, money being worth 6 per cent.?

— 407. Bought 24660 bricks, at \$6.25 per thousand. What did they come to?

— 408. If I buy 28 pieces of stuffs at 4£ per piece, and sell 10 of them at 6£ each, and 8 of them at 5£ each, at

what rate per piece must I sell the remainder, to gain 20 per cent. on the whole ?

409. If I buy a certain commodity at 6s. per pound Troy, how must I sell the same per ounce Avoirdupois, so as neither to make nor lose ?

410. What is the amount of \$320.25 for 2 years 10 months, 14 days, at 6 per cent. ?

411. A perpendicular tower, standing on a plain, is of such a height, that a line 160 feet long, drawn from the top to the plain, will strike the ground 30 feet from the centre of the base. What is its height ?

412. A manufacturer sold a quantity of sheeting for \$24600, which was 36 per cent. more than the cost of the material. What did he get for manufacturing it ?

413. A pail is 10 inches in diameter at the bottom, and 12 inches at the top, and 11 inches deep. How much water will it contain ?

414. A man bought a cask of wine, containing 65 gals., a part of which having leaked out, he found that $\frac{1}{3}$ of what remained was equal to $\frac{1}{4}$ of what leaked out. How much did he lose ?

415. Sold 6750 feet of boards at \$3.20 per hundred. What did they come to ?

416. If $7\frac{1}{4}$ yards of cloth cost \$9 $\frac{1}{2}$, how much will $9\frac{1}{8}$ yards cost ?

417. The spire of a church is a square pyramid (built of stone), each side of the base being 8 ft. 10 in., and its perpendicular height is 72 feet; each side of the cavity is 4 ft. 6 in. at the base, and its height 60 ft. How many solid feet of stone in the spire?

418. If 14 casks of raisins, each weighing 125 lbs., be carried 6 miles for \$6.25, what will be the cost of carrying 56 casks, each weighing 100 lbs., 66 miles?

419. A merchant bought a quantity of cloth at 11 cents per yard, and sold it at $12\frac{1}{2}$ cents. What did he gain per cent.?

420. A tin kettle is 14 inches in diameter at the bottom, and 18 inches at the top, and 24 inches high. How many gallons of water will it hold?

421. Three shafts make, in all, 590 revolutions per minute, in such order that the last makes 24 times as many revolutions as the first, wanting 7; the second, 5 times as many as the first, wanting 3. How many revolutions does each make per minute?

422. Two men own a bushel of wheat in such proportion, that twice the number of pecks owned by the first is equal to $\frac{1}{2}$ the number of quarts owned by the second. What did each own?

423. The diameter of a circle is 20 inches. What will be the circumference of a circle 3 times as large?

— **424.** A grocer bought a cwt. of spice for \$20, and retailed it at 20 cents per pound. What did he gain per cent.?

— **425.** What cost 6550 bricks at \$7.50 per thousand?

— **426.** A merchant sold a quantity of iron for \$245, which was $12\frac{1}{2}$ per cent. more than the cost. What was the cost?

427. If a pipe, $\frac{7}{8}$ of an inch in diameter, will fill a cistern in 4 hours, what should be the diameter of a pipe to fill the same in one hour?

428. A round stick of timber is 28 feet long, and 22 inches in diameter. How many cubic feet will it contain when hewn square?

429. A man bought cloth to the amount of 1965£, 4s., but forgot what he paid per yd., the number of yds. in a piece, and the number of pieces. He knew that the number of pieces, the number of yards in a piece, and the number of shillings paid per yard, were equal each to each. How many pieces did he buy?

— **430.** A room is 22 ft. long, 18 ft. wide, and 10 ft. high, and has 2 doors, 4 ft. 6 in. by 8 ft. 2 in. each, and 4 windows, 7 ft. by 4 ft. 8 in. each, and a mop-board 10 inches high. How many rolls of paper, 20 in. wide, 11 yards in each roll, will be required to cover the walls?

431. How many yards of plastering in the room described in the preceding question?

432. Some men and their wives met at a watering place, and agreed to stay till their bills amounted to such a sum that each man should pay twice as many dollars as there were persons in the company. Their bills amounted to \$784. How many men were there?

433. A saves $\frac{1}{4}$ of his income, and B, having the same income, spends $1\frac{1}{2}$ times as much as A, and finds himself \$62.50 in debt at the end of the year. What was the income of each?

➤ **434.** A person, being asked his age, said, "If $\frac{1}{3}$ of my age be multiplied by 13, and $\frac{2}{3}$ of it be multiplied by 11, and $\frac{1}{3}$ of it be added to the sum of these products, the sum will be 318." What was his age?

✓ **435.** A field, in the form of a rectangular parallelogram, containing $12\frac{1}{4}$ acres, is 4 times as long as it is wide. What are its sides?

436. A, B, and C have a debt of \$1500 to pay. They find that, if A and C pay all the money they have, \$200 will remain unpaid; if B and C pay all they have, \$350 will remain unpaid; and, if A and B pay all they have, \$400 will remain unpaid. How much money has each?

437. A and B bought a grindstone together, A paid \$16, and B \$12. It was agreed that A should grind off his share first. How many inches must A grind from the diameter, the stone being 4 ft. in diameter, and no allowance being made for the aperture in the centre?

— **438.** A ship sailed from Boston due south; another sailed due east the same distance. They were then 250 miles apart. How far was each ship from Boston?

439. The extreme point of the minute hand of a clock moves 5 inches in $3\frac{1}{4}$ minutes. What is the length of the hand?

440. A general, drawing up his army in a square, finds he has 284 men more than the greatest possible square; and, on attempting to increase each of 2 sides with one soldier, he wants 25 men to fill up the square. How many soldiers has he?

441. A person, after spending \$30 more than $\frac{1}{4}$ of his money, had \$10 more than $\frac{1}{3}$ of it left. How much had he at first?

442. How much less fence will be required to enclose 4 acres, in the form of a circle, than in the form of a square?

443. A merchant's commission, at 5 per cent., on a consignment of sugar, was \$95, by the gross sales of which the owner made 25 per cent. What was the invoice of the same?

444. What is the solid contents of the earth, supposing it a sphere, the diameter of which is 7912 miles?

445. A circular field, 80 rods in diameter, is to be divided, by means of concentric circles, into 3 equal

parts. What must be the diameters of the circles employed?

446. A drum, 24 inches in diameter, turns a pulley 12 inches in diameter, 42 revolutions per minute. What thickness of laths must be applied to it, that, with the same velocity, it may turn the same pulley 56 revolutions per minute?

447. A merchant charged $2\frac{1}{2}$ per cent. for selling certain goods, and $\frac{1}{4}$ of one per cent. for prompt payment of the net proceeds. The latter amounted to \$3.003. What was the commission?

448. A wheel, 8 feet in diameter, makes 24 revolutions per minute. How many feet does the circumference move per second?

449. I have a log 28 feet long, 2 feet in diameter at one end, and 1 foot at the other. How many cubic feet does it contain?

450. Four men bought grain of a farmer. The first bought $\frac{1}{3}$ of what he had and $\frac{1}{3}$ of a bushel more, the second $\frac{1}{3}$ of what remained and $\frac{1}{3}$ of a bushel more, the third $\frac{1}{3}$ of what then remained and $\frac{1}{3}$ of a bushel more, and the fourth $\frac{1}{3}$ of what was left and $\frac{2}{3}$ of a bushel more, and left 20 bushels. How many bushels did the farmer have, and how many bushels did each man buy?

451. A man has a bin 9 feet square and 6 feet high. How many bushels will it hold?

452. How many hhds. of water will a cylindrical cistern, 6 ft. 6 in. in diameter, and 8 ft. deep, contain?

453. What is the net weight of 50 drums of figs, weighing 62 lbs. each, tare 20 lbs. per cwt.?

454. A pulley, 24 inches in diameter, revolves 12 times while the belt revolves once. What is the length of the belt?

455. What quantity of water will run through a pipe 2 inches in diameter, in 24 hours, when the velocity is 5 feet per second?

— **456.** A man sold a farm for \$2940, which was 8 per cent. more than it cost him. What did it cost him?

457. How many loaves can be bought for 36 cents when corn is worth 75 cents per bushel, if 5 loaves can be bought for 40 cents when corn is worth 65 cents per bushel?

458. Bought the following bills of goods:

Jan. 20,	1852,	\$300	on a credit of 120 days.
Feb. 10,	"	150	" " " 90 "
Mar. 25,	"	200	" " " 120 "
Apr. 10,	"	250	" " " 60 "
May 30,	"	200	" " " 90 "

What will be the equated time for the payment of the whole?

459. If \$25.50 are paid for $\frac{1}{3}$ of a bale of cloth, what must be paid for $\frac{2}{3}$ of the remainder?

460. A man, having a field 30 rods square, sold 25 square rods to one of his neighbors, and 20 rods square to another. What is the value of the remainder at \$175 per acre?

461. How many bricks, 8 in. long, 4 in. wide, 2 in. thick, will be required to build the walls of a house of the following description? It is 36 feet long, and 26 feet wide; the side walls are 18 feet high, and the end walls, terminating in a point, and sloping to the outside of the side walls, 28 feet high. Space is allowed for 2 doors each 5 feet by 8, and 22 windows, each 4 feet by 6; and the walls are to be one foot thick.

462. What will 14 $\frac{1}{2}$ yds. of lace cost, in New York, at 4s. 6d. per yard?

463. If a cube of iron, whose side is 6 inches, weighs 60.5 lbs., what will be the weight of a cube of the same kind of iron, the side of which is 3 feet?

464. A man sold his farm for \$2500, payable in one year. At the end of 6 months he received \$1600. What was due him at the end of the year, money being worth 6 per cent.?

465. A grocer sold a quantity of butter for \$720, which was 10 per cent. more than the cost. How much did it cost him?

466. A mechanic increased his property annually by \$60 more than $\frac{1}{4}$ of it. At the end of the fifth year his estate amounted to \$1591 $\frac{1}{2}$. What was it at first?

467. How many boards will be required to cover a house 36 feet long, 25 feet wide, and 32 feet high in all, the ridge being 12 feet above the beam, and the roof projecting 1 foot in all directions, allowing 34 windows $3\frac{1}{2}$ by 6 feet, and 2 doors 4 feet by 8?

468. A man bequeathed 100£ to his three sons, as follows: to the second twice as much as to the first, wanting 8£; and to the third three times as much as to the first, wanting 15£. What was the share of each?

469. John Wilson bought goods as follows:

Jan. 5, 1852, \$120 on 6 months' credit.

Mar. 20, " 300 " 5 " "

Apr. 15, " 150 " 5 " "

May 20, " 400 " 6 " "

June 1, " 200 " 4 " "

June 10, 1852, he wishes to give his note for the whole. What time should be allowed him?

470. What cost $7\frac{1}{4}$ yards of cloth, at 3s. 9d. per yd., in Boston?

471. A pile of wood is 4 ft. wide, and 5 feet 4 inches high. How long must it be to contain 10 cords?

472. 24 ft. 9 in. to the mile, is what per cent.?

473. If a cellar, $22\frac{1}{2}$ feet long, $17\frac{3}{4}$ feet wide, and $10\frac{1}{2}$ feet deep, be dug in $2\frac{1}{2}$ days by 12 men, working 12.3 hours per day, in how many days should 9 men, working $8\frac{1}{2}$ hours per day, dig another, 45 feet long, $34\frac{1}{2}$ feet wide, and $12\frac{3}{4}$ feet deep?

474. A merchant invested \$10,000 in business of a certain kind, on which he lost 15 per cent.; he then invested the remainder, and gained 20 per cent. What per cent. did he gain in the two investments?

475. How much money, that is 6 per cent. below par, will pay a debt of \$560?

476. From one of 2 pieces of cloth, containing the same number of yards, 12 yards were cut, and from the other 22 yards; then one contained $\frac{2}{3}$ as much as the other. How many yards did each contain at first?

477. If 145 men can build a wall 16 feet high, and 80 feet long, in 8 days, in how many days will 68 men build a wall 240 feet long, and 14 feet high?

478. 2s. 8d. to the £, is what per cent.?

479. At 6s. 8d. per pair, what cost 654 pairs of gloves, in New York?

480. How much wood in a load 9 feet long, 4 feet wide, and 3 feet 10 inches high?

481. When A and B commenced business, A had $\frac{3}{4}$ as much money as B; but, at the end of the year, A having gained 16 per cent., and B having lost \$500, they had equal sums. How much had each at first?

482. A, B, and C formed a copartnership. A furnished $\frac{2}{5}$ of the capital, B $\frac{3}{10}$, and C the remainder. They gained \$5640. What was each one's share of the gain?

483. A man hired a certain number of men at \$1.50 per day, $\frac{1}{2}$ as many at \$1.20, $\frac{1}{3}$ as many at \$1.10, and $\frac{1}{4}$ as many at \$1.00, to all of whom he paid \$87.20 per day. How many of each did he hire?

484. A cubical block of granite, 12 inches on a side, weighs 166 pounds. What is the weight of one 6 feet on a side?

485. Bought a load of wood 8 feet long, and 4 feet 8 inches high, at \$4.75 per cord, and paid \$6.50 for it. What was its width?

486. What is the cost of insuring a dwelling-house for \$1500, at $\frac{1}{4}$ of one per cent.?

487. At what time between 3 and 4 o'clock do the hour and minute hands of a clock point in opposite directions?

488. What cost \$5000 of railroad stock, at 30 per cent. below par?

489. In a triangular piece of land, with a base of $82\frac{1}{2}$ rods, and a perpendicular of 58 rods, how many acres?

490. A can do $\frac{1}{4}$ a piece of work in 4 days, B can do $\frac{1}{5}$ of it in 5 days, C can do $\frac{1}{4}$ of it in 3 days, and D can do $\frac{1}{7}$ of it in 2 days. How long will it take them all to do the same work?

491. A lady bought 19 yds. of sheeting, and $47\frac{1}{2}$ yds. of calico. She paid 2 cents more per yd. for the sheeting than for the calico, and the calico cost twice as much as the sheeting. What was the price of each per yd.?

492. The specific gravity of a cubic block of pine, containing 64 cubic feet, is 675. To what depth will it sink in water?

493. What weight will the block, described in the preceding question, sustain in water?

494. A man, owning $\frac{3}{7}$ of a ship, sold $\frac{1}{7}$ of his share for \$2700. What part of the ship did he sell, and what was the value of the whole ship?

495. Bought a load of wood, 8 feet long, 4 feet 1 inch wide, and 3 feet 10 inches high, at the rate of \$6.50 per cord. What did I pay for it?

496. How many bottles, each containing 1 qt. $1\frac{1}{2}$ pts., can be filled from 14 hhds.?

497. At what times between 5 and 6 o'clock will the hour and minute hands of a clock be at right angles?

498. Having used my carriage two years, I sold it for \$72, which was 40 per cent. less than the cost. What was the cost?

499. A granite monument is 5 ft. $10\frac{1}{2}$ in. high, and 18 inches square at the base, and 14 at the top. What is its weight, its specific gravity being 2660?

Woonsocket, Jan. 1, 1847.

500. Six months after date I promise to pay John Greene, or order, one thousand dollars, with interest afterwards.

Samuel James.

On this note were the following endorsements: Sept. 10, 1847, \$300; Jan. 16, 1848, \$100; Nov. 25, 1849, \$50; Sept. 20, 1850, \$500. What was due Jan. 1, 1851?

501. A man in Boston, having \$279, spent a portion of it, and then found that $\frac{1}{4}$ of the number of dollars spent was equal to the number of shillings left. How much had he left?

502. How many cubic feet in a wall 3 feet thick at the bottom, and $1\frac{1}{2}$ feet thick at the top, and 6 feet high, the inside being perpendicular, enclosing a plat of ground 10 rods long and 6 rods wide?

503. What is the value of 20 hogsheads of sugar, each weighing 12 cwt., 3 qrs., 14 lbs.; draft 2 lbs. per cwt., and tare 12 lbs. per cwt., at \$6.75 per cwt. net?

504. If a cannon ball, 6 inches in diameter, weighs 32 lbs., what is the diameter of one weighing 12 lbs. ?

505. A gardener ordered an iron roller, the outside diameter to be 20 inches, the length 50 inches, and the thickness $1\frac{1}{2}$ inches. How many cubic inches will it contain ?

506. What will be the cost of the roller, described in the preceding question, at $3\frac{1}{2}$ cents per pound, its specific gravity being 7248 ?

507. If cloth, worth \$3.00 cash, is sold for \$3.20 on a credit of 6 months, what credit should be allowed on sugar, worth \$21 per box cash, sold at \$28 ?

508. If I can buy 3 lbs. of tea and 4 lbs. of chocolate for \$5, and 6 lbs. of tea and 7 lbs. of chocolate, at the same rate, for \$9.50, what is the price of each per lb. ?

509. A has tea, which he barter with B, at 10d. per lb. more than it cost, against cloth which cost B 10s. per yd., but which he, at the same profit per cent., puts at 12s. 6d. per yd. What was the cost of the tea ?

510. A cone contains 2242 cubic feet, and the diameter of the base is 16 feet. What is its height ?

511. Two men have the same money ; but, if the first give \$18 to the second, then he will have $\frac{5}{8}$ as much as the second. How much has each ?

6 sides.

512. A hexagonal prism measures 38 inches across the centre from corner to corner, and is 134 inches long. What is its surface?

513. What is the solidity of the prism described in the preceding question?

514. When I sell cloth at 14 cents per yard, I gain 75 cents on the piece; but when I sell it at $12\frac{1}{2}$ cents, I lose 15 cents on the piece. How many yards in the piece?

515. A man lost, in a speculation, $\frac{1}{4}$ of his money; he then gained a sum equal to $\frac{1}{4}$ of what he then had; afterwards he lost $\frac{1}{4}$ of what he then had, and then gained a sum equal to $\frac{1}{4}$ of what he had left, when he found he had \$1200. How much had he at first?

516. A merchant sent his agent \$7640, with which to buy goods, after taking out his commission of $3\frac{1}{4}$ per cent. How much did the agent lay out for his employer?

517. A merchant sold goods to the amount of \$650, $\frac{1}{2}$ to be paid in 6 months, and the other half in 10 months. What should be discounted for present payment, when money is worth 6 per cent. per annum?

518. A set out from Boston for Providence, and B from Providence for Boston, at the same time. At the end of 4 hours they met, when it was found that A had travelled $2\frac{1}{2}$ miles per hour more than B. Now, the dis-

tance between the two cities being 44 miles, how far did each travel per hour?

519. A man divided \$10,000 among his 4 sons; giving A \$4 as often as B \$5, and C \$6 as often as A \$3, and D \$7 as often as B \$4. What was the share of each?

520. A mason worked 12 days, having his apprentice with him 6 days, and received for both \$24.75; afterwards he worked 20 days, and his apprentice 9 days, and received for both \$40.37½. What was the daily wages of each?

521. Each side of the base of a triangular prism is 17 inches, and the length is 5 feet, 5 inches. What is its solidity?

522. A grocer bought as many boxes of mustard, pepper, and allspice, as cost him \$100. $\frac{1}{3}$ of them were mustard, $\frac{2}{3}$ of the remainder were pepper, and the remainder allspice. He sold the mustard at 8 cents per box, the pepper at 10 cents, and the allspice at 12 cents, and gained \$22. How many boxes of each did he buy?

523. Two cisterns received the same quantity of water; but one of them lost $\frac{1}{4}$ of what it received, and the other $\frac{1}{5}$ of what ran in. At the end of ten days, it was found that one contained 15 hhds. more than the other. How much did each receive per day?

524. Three men, A, B, and C, own a house together. A and B together own $\frac{1}{4}$ of it; B and C together own $\frac{1}{4}$ of it. What part of it belongs to B? What is the value of B's share, the whole being worth \$1260?

525. James Mason's note for \$2500 was given Jan. 1, 1852. March 3d, 1852, he paid \$250. June 15th, 1852, \$350. July 15th, 1852, \$400. Sept. 24th, 1852, \$500. Oct. 14th, 1852, \$600. What was due Dec. 25th, 1852? *Answer?*

526. Bought a cask of molasses at $27\frac{1}{2}$ cents per gal., but, $25\frac{1}{4}$ gallons having leaked out, I sell the remainder at $32\frac{1}{4}$ cents per gallon, and thereby lose 7 per cent. How many gallons did the cask contain?

527. What is the weight of the air in a room 42 feet long, 40 feet wide, and 14 feet high, a cubic foot weighing 1.22 oz. Avoirdupois?

528. What is the internal pressure of air in such a room, at 15 pounds to the square inch?

529. What is the weight of a round granite pillar, 36 feet long, 6 feet in diameter at the base, and 5 feet at the top, its specific gravity being 2650?

530. If a weight of 150 pounds be attached to the outside of a wheel 6 feet in diameter, what weight will it balance on the axle 5 inches in diameter?

531. If the surface of a globe, 1 foot in diameter, is 3.1416 feet, what is the surface of one containing twice the solidity?

× **532.** I sold a house for \$1500, and thereby lost 15 per cent. What per cent. should I have gained if I had sold it for \$2000?

533. What is the weight of a globe of platinum, 10 feet in diameter, its specific gravity being 22500?

534. A stick of timber, the transverse section of which is an equilateral triangle, of which each side is 32 inches, is 65 feet long. How many cubic feet does it contain?

535. The convex surface of a globe 1 foot in diameter is 3.1416 feet. What is the surface of one containing $\frac{1}{2}$ the solidity?

× **536.** Reduce 3 L., 1 m., 1 fur., 1 ft., and 1 in., to miles.

† **537.** If the Prov. and Wor. Railroad is 41 miles long, and 3 passenger trains and 2 freight trains run over it both ways each day of the year 1852, Sabbaths excepted, how many miles will the trains run? How many times round the earth, supposing, the circumference to be 25000 miles?

538. What should I pay for a perpetual annuity of \$800, money being worth 6 per cent.?

539. Out of a cask of wine, containing 80 gallons, 10 gallons were drawn, and then the cask was filled up with water; after which 10 gallons of the mixture were drawn out, and the cask again filled up with water; and so on for the third and fourth times. How many gallons of pure wine remained in the cask, the two fluids having been thoroughly mixed each time?

× **540.** A and B trade in company. A puts in \$1500 on the 1st of Jan., but B is unable to put in his share till the 1st of June. What must B then put in that he may have $\frac{1}{2}$ the profits at the end of the year?

541. A, B, and C, talking of their ages, B said his age was once and a half the age of A; C said his age was twice and $\frac{1}{10}$ the ages of both, and that the sum of their ages was 93 years. What was the age of each?

542. A ladder 50 feet long will reach a window 30 feet from the ground on one side of a street; and, without moving the foot, will reach one 40 feet high on the other side. What is the breadth of the street?

543. Says A to B, "multiply the number of dollars you have by the square root of the number I have, and the product will be 252;" "and," says B, "multiply the number you have by the square root of the number I have, and the product will be 294." How many had each?

544. A poor woman, carrying a basket of apples, was met by 3 boys, the first of whom bought half of

what she had, and gave her back 10; the second bought $\frac{1}{2}$ of what she then had, and gave her back 2; and the third bought $\frac{1}{3}$ of what she then had, and gave her back 1; after which she found she had 12 apples remaining. How many had she at first?

545. What is the area of a triangle whose sides are 30, 40, and 50 feet?

546. If a ladder 50 feet long will just reach the eaves of a house when the foot is 10 feet from the house, how long must a ladder be to reach a window 17.9897 feet below the eaves, when the foot stands 6 feet from the house? and what is the height of the house?

547. I find that, in selling goods, $16\frac{2}{3}$ per cent. of what I receive is clear gain. What do I gain per cent.?

548. A company, at a tavern, spent \$42.25, when they found that each must pay as many cents as there were persons in the company. How many were there?

549. Says A to B, "we both have \$400, and $\frac{1}{4}$ of yours and $\frac{1}{3}$ of mine, together, amount to \$120." What have they each?

550. If $\frac{2}{15}$ of a yard of cloth cost $\frac{1}{4}$ of a dollar, what will be the cost of $\frac{1}{12}$ of an ell English?

551. Five boys divide 60 marbles between them, in the proportion of 2, $1\frac{1}{4}$, 1, $\frac{1}{2}$, and $\frac{1}{4}$. How many had each?

552. I have a cylindrical cistern, 5 feet deep, that will hold 1600 gals. of water. What is its diameter?

553. I had 2 casks of oil, both containing the same number of gallons; from one of which I drew 45 gallons, and from the other 20, and then found twice as much in one as in the other. How many gals. did each contain at first?

× **554.** If 203 tons, 9 cwt., 3 qrs., 3 lbs., of cheese cost 4558£, 3s., what will one ton cost?

555. What will be the price of 22½ lbs. of nutmegs, at \$1½ per lb.?

556. A man bought 2 pieces of cloth, containing 40 yards in all. Each piece cost as many cents per yard as there were yards in the piece, and the cost of one was nine times the cost of the other. How many yards did each contain?

557. Five boys divided a number of marbles between them. John took $\frac{1}{2}$ of them wanting 5, James took $\frac{1}{2}$ of what then remained wanting 5, William took $\frac{1}{2}$ of what was then left wanting 5, Adin took $\frac{1}{2}$ of what then remained wanting 5, and Henry took the remainder, which was 25. How many were there in all? and how many did each take?

558. A boy bought 280 oranges, 2 for a penny, and 340 more at 3 for a penny, and sold them all at 5 for 2 pence. Did he gain or lose by the bargain, and how much?

559. John said to Charles, "Give me 100 cents, and I shall have as many as you." "No," said Charles, "you give me 100, and I shall have twice as many as you." How many had each?

560. Six carpenters, with each 2 apprentices, work 20 days, and receive \$420; afterwards 4 carpenters, with each 4 apprentices, work 8 days, and receive \$160, at the same rate. What is the pay of a carpenter per day, and what is that of an apprentice?

* **561.** When I sell cloth at 15 pence per yard, I gain 30 shillings on the piece; and when I sell it at 14 pence per yard, I gain 20 shillings on the piece. How many yards in the piece?

* **562.** The base of a triangular field is 120 rods, and the perpendicular is 86.42 rods. How many acres in the field?

563. How many cubic inches in a globe 2 feet in diameter?

564. A board is 24 feet long, 2 feet wide at one end, and tapers to a point at the other. If it be divided into 3 equal parts by transverse sections, what will be the length of each?

565. The sum of one side and one end of a rectangular field is 54 rods, and the number of square rods in the field is 720. What are the sides of the field?

566. A merchant bought 2000 yards of flannel, it being optional with him to pay 24 cents per yard cash

or 25 cents at the end of 2 months. What did he save by choosing the former, money being worth 8 per cent. ?

567. A man leaves \$2000 to be divided between his three sons, John, Edwin, and Peter, in such proportion that the amounts of their shares, at 6 per cent. per an., simple interest, shall be equal when they are 21 years of age. John is 19, Edwin 17, and Peter 11 years old. What is the share of each ?

568. A merchant bought a quantity of corn, for which he paid a certain amount of money ; but, on measuring it, he found he had 5 per cent. less corn than he expected. He sold it, however, so as to gain 10 per cent., and received for it \$836, which was 12 cents per bushel more than it would have cost him had he received the quantity he expected. How many bushels did he buy ? and what did it cost him per bushel ?

569. Bought goods for \$1000, of which \$200 is to be paid down, \$400 in 5 months, and the remainder in 10 months. What will be the equated time for the payment of the whole ?

570. A cone, 42 feet high, and 32 feet in diameter at the base, has how many square feet in its convex surface ?

571. What will be the amount of \$27.50 for 6 years, 6 months, 6 days, at $7\frac{1}{2}$ per cent. ?

572. If $\frac{3}{4}$ of a ton of hay cost \$7.50, what is the price of $2\frac{1}{4}$ tons?

573. A boy engaged to work for a gentleman one year for \$100 and a suit of clothes; but, having worked 7 months, he was obliged to return home, when he received the suit of clothes and \$45. What was the value of the clothes?

574. A man, whose weight was 200 pounds, wishing to ascertain the weight of a bar of iron 8 ft. long, placed a prop under it 2 feet from one end, and found that when he stood upon it 20 inches from the prop it just balanced. How much did the bar weigh?

575. A and B have the same income. A saves $\frac{1}{3}$ of his yearly; but B, spending \$50 per year more than A, at the end of 4 years is \$100 in debt. What is their income, and what do they each spend per year?

576. A cone, 24 feet high and 16 feet in diameter at the base, is to be divided, by sections parallel to its base, into three equal parts. What must be the height of each?

577. What will be the interest of \$450.20 for 2 years, 6 months, and 3 days, at 8 per cent.?

578. If $\frac{3}{4}$ of a barrel of flour cost \$1.26, what will be the cost of $5\frac{1}{4}$ barrels?

579. A and B barter. A sells B tea, worth 3s. 9d. cash, at 4s. What should B charge A for coffee worth 9d. cash?

580. I laid out 500£ in muslin, upon examination of which I find 3 bales out of 9 damaged, so that I can get but 5s. per yard for it, and by so doing I find I must lose 50£ on that part. At what rate must I sell the remainder per ell English in order to gain 50£ by the whole transaction?

581. If the sun moves 1 degree per day, and the moon 13 degrees, and, at a certain time, the sun be at the beginning of Cancer, and, 3 days afterwards, the moon at the beginning of Aries, what is the place of the next following conjunction?

582. A merchant, about to ship 2880 cubic feet of merchandise, proposed to pay a carpenter a certain sum for the requisite boxes, if he should make them 5 feet long, 4 feet wide, and 3 feet high, inside; and \$30 more if he should make them 4 feet long, 3 feet wide, and 2 feet high, the boxes to be made of inch boards. He chose to make them of the latter size. Now, it took him 6 days longer to make them, and he paid \$25 per M. for his boards. Did he gain or lose by his choice, his time being worth \$1.50 per day, and how much?

583. What is the value of $\frac{3}{4}$ of a ton of potash, when $\frac{3}{4}$ of a cwt. cost \$2.20?

584. A man, having \$50, laid out a portion of it, and afterwards earned 5 times as much as he had laid out, when he found he had double what he had at first. How much did he lay out?

585. A man bought 8 cows and 12 sheep for \$196, and afterwards sold, at the same rate, 6 cows and 6 sheep for \$138. What was the price of each?

586. A field, in the form of a right-angled triangle, measures 30 and 50 rods on the sides, including the right angle. What is the length of the hypotenuse, and how many acres in the field?

587. A manufacturer orders his carpenter to make 20 boxes, of uniform size and shape, capable of containing 1280 cubic feet, the boards to be 1 inch thick. How many feet of boards will he save by making them cubical, instead of 5 feet long and 4 feet wide inside?

588. A man has 2 silver cups of unequal weight, with one cover weighing 5 oz. for both. If he puts the cover on the less, it will weigh twice as much as the greater; and if he puts it on the greater, it will weigh three times as much as the less. What is the weight of each cup?

589. If $\frac{2}{3}$ of a barrel of beer is worth \$2.50, what is the value of $\frac{1}{3}$ of a hhd.?

590. A drover bought a lot of sheep and lambs for \$1000, giving \$3 for sheep, and \$2 for lambs. Afterwards he sold $\frac{1}{2}$ of his sheep and $\frac{1}{2}$ of his lambs for \$387.50, which was \$37.50 more than they cost him. How many of each did he buy?

591. What proportion of teas, at 36, 42, 55, and 70 cents per lb., may be mixed, so that the mixture may be worth $62\frac{1}{2}$ cents per lb.?

592. If, by selling cloth at 5s. 9d. per yard, I gain 15 per cent., what shall I gain by selling the same at 6s. per yard?

593. If 3 carpenters, who have each 8 apprentices, in 5 weeks, of 6 days each, can earn \$360, how many dollars will 5 carpenters, who have each 10 apprentices, earn in 8 weeks of $5\frac{1}{2}$ days each, their wages being the same, and the apprentices being allowed half pay?

594. John Smith has tea at \$1.06 cash; but, in trading with Joseph White, he charges \$1.25. What should White charge him for tobacco which he sells at 18 cents cash?

595. What is the surface of a cone, 12 feet in diameter at the base, and 36 feet high?

596. How many cubic inches in a globe 3 feet in circumference?

597. If 25 bushels of corn are worth 10 bushels of wheat; and 25 bushels of wheat, 75 bushels of potatoes; and 36 bushels of potatoes, 48 bushels of oats; and 24 bushels of oats, 16 bushels of rye; and 12 bushels of rye, 8 bushels of beans; how many bushels of corn are worth 40 bushels of beans?

598. If I sell cloth at 17 cents per yard, I gain \$1.20 on the piece; but when I sell the same at 18 cents per yard, I gain \$2.00 on the piece. How many yards in the piece?

— **599.** For what sum shall I present a note, at the bank, on 90 days, to receive \$450?

600. A cone is 24 feet high, and contains 1452 cubic feet. What is the diameter of its base?

601. A man, starting on a journey, had \$115. When he arrived at his journey's end, he found that $\frac{2}{3}$ of the number of shillings left was equal to $\frac{3}{4}$ of the number of dollars spent. How many dollars had he left?

602. A merchant bought 17 hhds. of sugar, each weighing 14 cwt., 2 qrs., at \$4.25 per cwt. gross, and sold the same at \$5.50 per cwt. net, the draft being 3 lbs. per cwt., and the tare 8 lbs. per cwt. What was his whole gain?

603. A merchant sold a cubical bin of oats for \$384.16, and received as many cents per cubic foot as there were feet on a side. What was the size of the bin?

604. Two men are of the same age, but if one were $10\frac{1}{2}$ years older, and the other $12\frac{1}{4}$ years younger, one would be twice as old as the other. What is their age?

605. A gentleman had 7£, 17s., 6d., to pay to his laborers. To every boy he gave 6d., to every woman

8d., and to every man 16d. For every boy there were 3 women, and for every woman 2 men. How many were there of each?

606. A, B, and C, hired a sheep pasture for \$100, from the 1st of June to the 1st of October. At first A put in 150, B 100, and C 125 sheep; on the 1st of July A took out 20, B put in 30, and C took out 10; on the 1st of Aug. A put in 10, B took out 20, and C put in 30; on the 1st of Sept. A put in 40, B put in 10, and C put in 20. What must each pay?

607. A man has 800 pounds of sugar, for which he paid $6\frac{1}{4}$ cents per pound. How much of that which cost him $4\frac{1}{4}$ cents per pound must he mix with it, that he may sell the mixture at $6\frac{1}{4}$ cents per pound, and gain 10 per cent.?

608. Sold 800 ells English of cloth for \$3450, and gained on each yard $\frac{1}{4}$ the cost of an ell Flemish. What was the cost per yard?

609. A man sold a house for \$5880, which was 8 per cent. less than it cost him. What was the cost?

610. John has $\frac{3}{4}$ of a bushel of chestnuts; Peter has $\frac{1}{4}$ as many as John; William has $\frac{1}{4}$ as many as Peter; Samuel has $\frac{1}{4}$ of a bushel; Eli has $\frac{3}{4}$ as many as Samuel and Peter together; and Leander has $\frac{3}{4}$ as many as Eli. How many have all?

611. A ship sails from port, south, 250 miles, then east 170 miles; afterwards she sails south 180 miles;

and then east 160 miles. How far from port is she then?

612. If 10 men and 2 boys dig a trench, $24\frac{1}{2}$ rods long, $5\frac{1}{2}$ feet deep, and $5\frac{1}{2}$ feet wide, in $20\frac{1}{2}$ days, when the days are $11\frac{1}{2}$ hours long, how many men will be required to dig a trench, when the ground is harder in the proportion of 7 to 5, $32\frac{1}{2}$ rods long, 7 feet wide, and $4\frac{1}{2}$ feet deep, in $27\frac{1}{2}$ days of $9\frac{1}{2}$ hours each, 3 boys being equal to 1 man?

613. A trader bought corn at 62 cents per bushel, and sold it for 55 cents. What did he lose per cent.?

614. What is the length of filleting, $1\frac{1}{2}$ inches wide, and $\frac{1}{2}$ inch thick, required to cover a cylinder, $12\frac{1}{2}$ inches in diameter, and $19\frac{1}{2}$ inches long?

615. How much wood in a load, 8 feet long, 5 feet 4 inches high, 3 feet 6 inches wide at the bottom, and 4 feet 4 inches at the top?

616. A general has an army of 3600 men, which he arranges in a square, making rank and file equal. How many men must be added that rank and file may be increased by 4 each?

617. A hexagonal stick of timber, of uniform size, of which each side is 18 inches, is 42 feet long. How many cubic feet in the stick?

618. At 5s. 3d. per yard, in N. E., what will 720 yards of silk cost?

619. A man engaged a workman for 100 days, on condition that, for every day he worked, he should receive 80 cents; and, for every day he was idle, he should forfeit 40 cents. He paid him \$57.20. How many days did he work?

620. If 20 tons of iron cost \$400, what is the cost of 14 pounds of the same?

621. If a pipe, $4\frac{1}{2}$ inches in diameter, will discharge a certain quantity of water in one hour, in what time will a pipe, $2\frac{1}{2}$ inches in diameter, discharge the same quantity?

622. A tub is 6 feet in diameter at the top, and 5 feet at the bottom, and 6 feet deep. How much water will it hold?

623. John Wilson has a bin of salt, the length of which is 3 times the width, and the width $1\frac{1}{2}$ the height; for which he paid $2\frac{1}{2}$ times as many cents per cubic foot, as the bin is feet high; it cost him \$43.20. What is the size of the bin?

624. A garden, 10 rods long and 6 rods wide, is to be enclosed by a wall, 6 feet high, 3 feet thick at the bottom, and $1\frac{1}{2}$ feet thick at the top. How many cubic feet in the wall, the sides sloping equally?

625. From the wide end of a field, 60 rods long, 40 rods wide at one end, and 25 rods wide at the other, how many rods must be cut off to contain 8 acres?

626. What must be the diameter of a circle containing 8 times the area of one 25 feet in diameter?

627. If I buy a cargo of sugar, consisting of 400 hhds., each weighing 10 cwt., 2 qrs., 14 lbs., tare 16 lbs. per cwt., at \$5.50 per cwt. net, and pay 25 cents per hhd. freight, what does it all cost in my store?

628. If, at each stroke of the piston, a locomotive moves $12\frac{1}{4}$ feet, and it runs at the rate of 40 miles per hour, how many strokes does it make per second?

629. A man bought a block of granite, the length of which was twice the width, and the width twice the thickness, and paid twice as many cents per cubic foot as the block was feet long. It cost him \$10.24. What was the size of the block?

630. Four persons, A, B, C, and D, live at the four corners of a rectangular parallelogram. The distance from A's house, on the N. W. corner, to the middle point between B's, on the N. E. corner, and C's, on the S. E. corner, is 80 rods. From B's to the middle point between C's and D's is 100 rods. What is the distance from A's to C's?

631. The British government, at the close of the American revolution, owed 280,000,000£; and the £ contains 3 oz., 7 pwt., 10 grs. of silver. If that debt were paid in silver, how long a train of cars, each car, including room for coupling, being 30 feet long, and car-

rying 10 tons, allowing 2000 lbs. to the ton, would be required to carry it?

632. Bought $16\frac{1}{2}$ boxes of sugar, each weighing 4 cwt., 2 qrs., 14 lbs., at \$6.25 per cwt. net. What did it come to, tare being 16 pounds per cwt.?

633. What length of inch rope will lap a drum, 20 inches in diameter, and 36 inches long?

634. An octagonal stick of timber, of uniform size, each side of which is 1 foot, and the perpendicular distance between the opposite faces of which is 2.4142136 feet, is 50 feet long. What is its solidity?

635. If a lever, 15 feet long, rest on a prop 10 inches from the end, what force will it exert by the application of 150 pounds' power at the other end?

636. What will be the cost of painting the convex surface of a cone, 30 feet high, the diameter of the base of which is 20 feet, at 15 cents per square yard?

637. A commission merchant, in Providence, has in his hands \$1000 due to a merchant in New Orleans, as net proceeds of his cotton. This is to be remitted to the latter per bill on a broker in New Orleans, in his favor

when bills on New Orleans are at 2 per cent. discount
What should be the amount of the bill ?

638. What is the value of 25 casks of rice, each weighing 6 cwt., 2 qrs., 21 lbs., draft 4 per cent., tare 8 per cent., at \$2.50 per cwt. net ?

639. What difference will there be between the lengths of a rope one inch in diameter, and a strap one inch wide and $\frac{3}{4}$ of an inch thick, required to lap a drum 18 inches in diameter, and 24 inches long ?

640. What is the number of cubic feet in a mast, 72 feet long, 3 feet 6 inches in diameter at the base, and 1 foot 3 inches at the top ?

641. A piece of copper, that weighs 27 lbs. in air, and 24 lbs. in water, is attached to a piece of wood that weighs 20 lbs. in air, when it is found that both weigh 14 lbs. in water. What is the specific gravity of the wood ?

642. What will be the duty on a piece of flannel, 62 yards long, and 50 inches wide, estimated at 32 cents per square yd., the duty being 30 per cent. ad valorem ?

643. If 3 men cut $15\frac{1}{2}$ cords of wood in $2\frac{1}{2}$ days, how many men will be required to cut $69\frac{3}{4}$ cords in $6\frac{1}{4}$ days ?

644. A merchant bought a quantity of flour, at \$4.87 $\frac{1}{2}$ per barrel, on a credit of 4 months, and kept it 6 months.

At what price must he sell it, on 3 months' credit, to gain 5 per cent., when money is worth 6 per cent.?

645. A merchant bought a number of bushels of corn, and, having sold $\frac{1}{3}$ of it and 6 bushels more to A, and $\frac{1}{3}$ of the remainder wanting 6 bushels to B, had 30 bushels left. How many bushels did he buy?

646. A cone of silver, 16 inches high, is owned by 3 men in equal shares. If it be divided by sections parallel to the base, what will be the height of each man's share?

647. Two men, A and B, agree to perform a piece of work in 12 days; but having labored 5 days, A agreed to finish the work, which he did in 15 days. In how many days would B have finished the work?

648. W. Allen had cotton cloth, and S. Walker had silk, in exchanging which, Allen gave Walker $4\frac{1}{2}$ yards of cotton for 1 of silk. But afterwards, cotton having risen 10 per cent., and silk 15 per cent., how many yards of silk should Walker give Allen for 50 yards of cotton?

649. A hollow globe of brass is to be made 10 inches in diameter, of sufficient weight to sink, in water, to its centre. How thick must it be made, the specific gravity of the brass being 7824?

650. If $8\frac{1}{2}$ yards of cloth, $1\frac{1}{2}$ yards wide, will be required to make a suit of clothes, how much will be required of that which is only $\frac{1}{2}$ yard wide?

651. I wish a vessel of tin, the diameter of the bottom of which is 7 inches, the diameter to diminish one inch in rising 3 inches, that shall contain 1 gallon, wine measure. How high must it be made?

652. Three shafts together make 235 revolutions per minute, the first making a certain number, the second twice as many and 3 more, and the third twice as many as the second and 5 more. How many revolutions will each make per minute?

1/2 ft
8 in. { **653.** I wish to lay out a rectangular field, that shall contain 9 acres, so that 168 rods of fence will enclose it. What must be its length and breadth?

654. A square field contains $\frac{1}{16}$ as many acres as it requires rails to enclose it. The rails are $16\frac{1}{2}$ feet long, and the fence is 5 rails high. How many acres in the field?

655. A garden, 10 rods long, and 6 rods wide, is to be enclosed by a wall, 6 feet high, 3 feet thick at the bottom, and $1\frac{1}{2}$ feet thick at the top. How many cubic feet in the wall, it being perpendicular on the outside?

656. A ship has a leak which would fill and sink it in 20 hours, but its pumps are capable of emptying it in 21 hours. If the pumps are worked from the time the leak commences, how long before the ship will sink?

657. A well is dug 45 feet deep, and 9 feet in diameter, and is to be stoned so as to leave the diameter

3 feet 6 inches. How many feet of stone will be required ?

658. A rod of English iron, 16938 feet long will just sustain its own weight. What weight will a rod an inch square sustain, its specific gravity being 7788 ?

659. A and B travelled together. When they started, $\frac{1}{6}$ of A's money was equal to $\frac{1}{11}$ of B's ; but, after each had spent \$8, $\frac{1}{3}$ of A's money was equal to $\frac{1}{3}$ of B's. How much had each at first ?

660. A man hired a certain sum of money, and, at the end of 3 years, paid \$550.25, allowing 6 per cent. compound interest. What was the sum hired ?

661. If I deposit, in a savings bank which pays 5 per cent. per annum, \$10 per year for my daughter, commencing at her birth, to what sum will it amount when she shall be 21 years old ?

662. John has 5 cents more than Peter, and $\frac{1}{3}$ of John's money is equal to $\frac{1}{4}$ of Peter's. How much has each ?

663. What is the weight of a monument of Egyptian marble, 12 feet high, 5 feet square at the base, and 2 feet square at the shoulder, and terminating in a point 18 in. above the shoulder, the specific gravity being 2668 ?

664. If the specific gravity of wrought-iron be 7788, what must be the diameter of a shaft, 20 feet long, to weigh 2 tons ?

665. If a man must pay $1\frac{1}{2}$ per cent. each year in advance, for insurance, how often might he as well be burned out, allowing 6 per cent. compound interest?

666. At .0001 of a cent each, how many tacks can I buy for \$200?

667. A merchant bought a quantity of butter, at \$18 per cwt. cash. At what price must he sell it to gain 10 per cent., and allow 6 per cent. discount for cash?

668. John and James, talking of their ages, James said his age was once and a half the age of John; and Harry, standing by, said that his age was twice and one tenth the age of both, and that the sum of all their ages was 93 years. How old was each?

669. A man has $20\frac{1}{2}$ feet of $1\frac{1}{2}$ inch plank, of which he wishes to make a cubical box. How large can the box be?

670. Said A to B, $\frac{1}{2}$ of my money is equal to $\frac{1}{3}$ of yours, and the difference between yours and mine is \$8. How much had each?

671. What must be the height of a cylinder, 44 in. in circumference, to contain 3 cubic feet?

672. Divide \$1000 between A, B, and C, so that B shall have \$50 more than A, and \$60 less than C.

673. A cubical block contains 389017 solid feet. What is the area of one side?

674. A man, having a cask of wine containing 100 gallons, drew out 10 gallons and filled up the cask with water, and then drew out 10 gals. more and again filled it up with water; he thus continued, alternately drawing and filling, until the cask contained only 53.1441 gallons of wine. How many gals. of liquid were drawn out?

675. What will be the equated time for the settlement of the following account, so that, allowing interest on each entry from the time when it was made, no interest will be due?

Amos Hadley.

Dr.			Cr.		
1852.			1852.		
Sept. 10,	To Cash	500.	Aug. 10,	By Cloth	275.
Oct. 25,	" Flour	75.	Oct. 5,	" Cash	500.
Nov. 4,	" Cash	325.	Oct. 20,	" Merch.	50.

676. A, B, and C engage to hoe an acre of corn for \$3. A alone can hoe it in 48 hours; B in 36 hours; and C in 24 hours. A begins first, and works 10 hours alone; then B commences, and they work together 6 hours; then C commences with them, and they all work till it is finished. How much ought each to receive for his labor?

677. A merchant having cotton cloth, exchanged a part of it for silk, giving 4 yards of cotton for $1\frac{1}{2}$ yards of silk. Soon after, cotton cloth rose 10 per cent., and silk fell 15 per cent. How many yards of cotton cloth should he then give for 20 yards of silk?

678. A piece of timber is 21 inches square at one end and 3 inches square at the other, and 12 ft. long. What length must be taken from the larger end, to contain 5 solid feet?

679. A merchant bought a quantity of goods, on 6 months' credit, which he kept 10 months, and then sold for \$2500, and allowed a discount of 6 per cent. for cash, and gained 12 per cent. by the transaction, when money was worth 6 per cent. What did he pay for the goods?

Boston, Nov. 2, 1852.

680. Six months after date I promise to pay William H. Lindsey, or order, six hundred dollars, for value received, with interest afterwards. JOHN SMITH.

On this note are the following endorsements: Dec. 1c, 1852, \$150. Jan. 25, 1853, \$75. April 2, 1853, \$100. June 12, 1853, \$175. What will be due Sept. 12, 1853?

681. If 12 oxen eat $3\frac{1}{2}$ acres of grass in 4 weeks, and 21 oxen eat 10 acres in 9 weeks, how many oxen would eat 24 acres in 18 weeks, the grass being at first equal on each acre, and growing uniformly?

682. How many feet of square-edged boards, equal in width each to each, one inch thick, can be sawn from a log, 20 feet long, 26 inches in diameter at one end, and 20 inches at the other, allowing $\frac{1}{4}$ inch for the saw-cut? How many boards in the stock?

683. In the case described in the preceding question, what would be the loss in diminishing the number of boards by one? What in increasing the number by one?

684. A man bought a horse, and paid a ten-dollar bill and $\frac{3}{7}$ of the remainder down, leaving \$76 unpaid. What was the price of the horse?

685. What is the least number of hhd., wine measure, that can be measured out by gallons, wine measure, beer measure, and dry measure, in each case without a remainder?

686. What is that number which, being multiplied by the 4th power of the same number, gives 11881376?

687. An iron pipe, bringing water into a city, is 2 feet in diameter. It is then separated into 3 equal pipes, the capacity of which, taken together, is equal to that of the principal pipe. What is the diameter of each of the last?

688. How much Federal money will pay, in Boston, a debt of £2450 10s., due in Liverpool, bills on Liverpool being 8 per cent. below par, and the par value of the pound being \$4 $\frac{1}{2}$?

689. A manufacturer, failing in business, offers to pay his creditors 75 cents on a dollar in one year, without interest, or to furnish ample security for the payment of the whole in 6 years, without interest. Allowing money to be worth 6 per cent. annually, which proposal is the more advantageous to the creditor?

690. He owes A \$25,000; and he, through ignorance, accedes to the wrong proposal. Allowing 6 per cent. compound interest, what is his present loss in consequence of his choice?

691. A gardener has an acre of land, in the form of a square, which he plants with cabbages, 28 inches apart, in the most economical manner, no plant being placed nearer than 14 inches to the border. Sixty per cent. of his cabbages head, and the heads average $4\frac{1}{2}$ lbs. each. He sells them at $1\frac{1}{4}$ cents per lb. What does he receive for his crop?

692. Walter Dean had 350 yds. of silk, for which he demanded 75 cents per yd., cash. Joseph Allen had broadcloth for which he asked \$3.50 per yd., cash. Dean sold his silk to Allen at $87\frac{1}{2}$ cents per yd., expecting to receive his pay in broadcloth at a corresponding barter price. Allen concluded, however, to pay him \$125 cash, and the remainder in cloth. How much should Allen, in justice, charge him for his cloth?

693. "Bought 3 hhds. of wine for \$320 ready money, and sold it at \$1.87 per gallon on 6 months' credit. What did I gain, allowing money to be worth 6 per cent. per year?"

James and John, finding the foregoing in their lesson, could not agree as to its meaning. James, with the author of their book, supposing it to require the gain at the end of the 6 months' credit; but John, more naturally, supposing it to ask for the gain at the time

of sale. Each solved it, according to his own understanding of it, correctly. What was the difference of their answers?

694. If a cannon-ball 5 inches in diameter weighs 32 lbs., what must be the diameter of one to weigh 48 lbs., made of a material the specific gravity of which shall be to that of the former as 9 to 8?

695. If the extreme point of the minute-hand of a clock moves 5 inches in two minutes, how far will the point of the hour-hand of the same clock move in a day, the minute-hand being $1\frac{1}{2}$ inches longer than the hour-hand?

696. Two merchants, one from Boston and the other from Providence, met in New-York. The Boston merchant had purchased at auction 10,000 bushels of white corn, and the Providence merchant had bought 10,000 bushels of yellow corn in the same way. Now, white corn is worth 3 per cent. more than yellow in Providence, and yellow is worth 4 per cent. more than white in Boston, and white is worth 2 per cent. more in Providence than in Boston, and white is worth 70 cents in Providence. What will each gain by exchanging the whole, bushel for bushel?

697. A man wishes to divide \$8000 between his two sons, aged 10 and 14 years, in such a manner that if the share of the elder is put out at 6 per cent. simple interest, and that of the younger at 5 per cent. com-

pound interest, they will have equal sums when they become 21 years of age. What must be the share of each?

698. What will they each receive when they become 21 years of age?

699. The specific gravity of a certain kind of cast-iron is 7172, and that of sea-water 1026.3. What must be the thickness of a hollow cube of the iron, one side of which is 6 feet long, that it may float 1000 lbs. weight in the sea?

700. If a mass of 160 bushels consists of corn and wheat, in the proportion of 3 to 7, how much corn must be taken away that the proportion may be 4 to 11?

701. If the pendulum vibrating seconds is 39.1 inches long, how long must it be to vibrate once in two seconds, the times of vibrating being as the square roots of their lengths?

702. If a line drawn from a point on one side of a square, $\frac{1}{4}$ the distance from one angle to the adjacent angle, to a point on the adjacent side, $\frac{1}{4}$ the distance from the same angle to the other adjacent angle, measures 42 ft., what is the length of one side of the square?

703. The fore-wheels of a carriage are $10\frac{1}{2}$ feet in circumference, and the hind-wheels $14\frac{1}{4}$ feet. How far must the carriage run in order that the fore-wheels may make 2000 revolutions more than the hind ones?

704. If I multiply a certain number by 5, subtract 24, divide the remainder by 6, and add 13 to the quotient, I obtain the original number. What is that number?

705. John Cushman has \$10,000 to let, for which he demands 6 per cent. interest, in advance. William Hall wishes to hire it for one year, but Cushman is not willing to let it for so long a time at once, as he prefers to receive his interest oftener; but offers to let him have it 4 times, 3 months at a time, to which Hall readily assents. Does Hall gain or lose by Cushman's choice? And how much, allowing money to be worth 6 per cent.?

706. Two orifices, in the side of a reservoir, are to each other as 5 to 13, and the velocity of the water from the smaller is to that from the larger as 8 to 7. Now, in a certain time, 561 cubic feet more issues from one than from the other. How much water is discharged from each in that time?

707. A man has three pieces of metal of equal size. 5 cubic inches of the first weigh $69\frac{1}{2}$ oz.; $3\frac{1}{2}$ cubic inches of the second weigh 41 oz.; and $4\frac{3}{4}$ cubic inches of the third weigh 91 oz. If the three pieces together weigh $949\frac{1}{2}$ oz., what is the size of each?

708. A man wishes to enclose a circular field that shall contain $\frac{2}{7}$ as many acres as it will require rails to enclose it, the rails being 12 ft. long, and the fence 4 rails high. What must be the diameter of the field?

709. A commission merchant received 250 bushels of corn from A, 600 from B, and 450 from C. B's is 6 per cent. better than A's, and 10 per cent. better than C's. He sells the whole in a lot, at 78 cents per bushel, and charges 4 per cent. for selling. What should he remit to each?

710. Wishing to ascertain the exact number of cubic feet in a quantity of irregular-shaped stone, I immersed them in a cistern of water 8 feet square, and found the water to rise 3 ft. $4\frac{1}{2}$ inches. What was the measurement of the stone?

711. A $1\frac{1}{2}$ inch lead pipe, $\frac{1}{16}$ inch thick, is to be laid, which shall weigh 4093.4557125 lbs. The specific gravity of the lead is 11400. What is the length of the pipe?

712. Bought a house and lot, Jan. 10th, 1850, for \$2500. Sept. 20th, 1850, paid for repairs and tax \$150. Jan. 10th, 1851, received \$250 rent. April 10th, 1851, paid for additional lot \$250. Sept. 30th, 1851, paid tax \$20. Jan. 10th, 1852, received rent \$250. Sept. 1st, 1852, paid tax \$20. Jan. 10th, 1853, received rent \$300. Sept. 2d, 1853, paid tax \$27.50. Jan. 10th, 1854, received rent \$300. Sept. 24th, 1854, paid tax \$30. Jan. 10th, 1855, received rent \$225. May 1st, 1855, sold house, lot, and rent due, for \$2700. What did I gain, allowing 6 per cent. simple interest?

713. John Cotton invested his money in a bank and received 6 per cent. per annum, compounded semi

annually, and let it remain 10 years. At what per cent. simple interest should he have let it in order to receive the same amount in the same time?

714. If 3 lbs. Av. of silver is worth 55 pwt. of gold, how many lbs. Troy of silver can be bought for 10 oz. Av. of gold?

715. What should be the calibre of a gun to throw a 48 lb. shot, allowing $\frac{1}{8}$ of an inch on all sides for windage, the specific gravity of the shot being 7280?

716. A grocer has 3 kinds of sugar. When he mixes 3 lbs. of the first kind, 4 of the second, and 2 of the third, the mixture is worth $7\frac{1}{2}$ cents per pound; when he mixes 5 lbs. of the first, 2 of the second, and 4 of the third, it is worth $7\frac{1}{4}$ cents per pound; and when he mixes 7 lbs. of the first, 8 of the second, and 5 of the third, the mixture is worth $7\frac{1}{2}$ cents per pound. What is the value of each per pound?

717. The prices paid for 20 yds. of cloth were in geometrical progression. The price of the first yard was 5 cents, that of the seventh was $9\frac{1}{2}$ cents. What was the price of the whole?

718. What shall I pay per bbl. for pork in Cincinnati, that I may hire the money to pay for it and all expenses at a bank, on 60 days at a time, pay \$2.50 per bbl. freight to Boston, keep it 5 months from the time when I remit the money for it, and sell it on 3 months' credit, for \$16 per bbl., and gain 5 per cent. on the money laid out?

719. A salt-bin is 4 feet wide at the bottom, 6 feet wide at the top, and 5 feet high. How long must it be to contain 360 bushels?

720. A has a certain sum of money, and B has $\frac{4}{5}$ as much; but if B pays A 16 dollars, B will then have $\frac{1}{2}$ as much as A. How much has each?

721. How much of its weight would a ton lose by being elevated to the top of a mountain 5 miles high, allowing the diameter of the earth to be 7964 miles?

722. A merchant bought 200 bbls. of flour at \$7.50 per barrel, and sold it so that 15 per cent. of what he received for it was gain. He then invested the money received for the flour in corn, which he was obliged to sell at a loss of 5 per cent. He then invested the money received in flour, on which he gained 3 per cent. Investing the money received in hemp, he was able to sell the hemp so that 10 per cent. of the money received was gain. What did he gain in all?

723. The sides of a rectangular block of stone are to each other as the numbers 2, 3, and 4. It contains 375 cubic feet. What are its dimensions?

724. What is the amount of \$710 for 1 year, 2 months, and 12 days, at 8 per cent. per annum?

725. The specific gravity of mercury is 13568, and that of Quincy granite is 2661. What weight would a

cubical block of the granite, one side of which is three feet long, float in mercury?

726. A careless grocer bought 10 hhds. of molasses, each containing 120 galls., at 24 cents per gall., and retailed it at 28 cents, beer measure. Did he gain or lose by the operation, and how much?

727. A line drawn from one angle of a square to a point on the opposite side, one third the distance from the adjacent to the opposite angle, is 982 feet. What is the length of one side of the square?

728. What is the net weight of 5 boxes of sugar, weighing as follows: 662, 710, 597, 872, and 812 lbs., allowing 4 lbs. per box draft, and 15 per cent. tare?

729. If $\frac{3}{4}$ of a yard of broadcloth is worth $2\frac{1}{4}$ yards of doeskin, and $\frac{1}{4}$ yard of doeskin is worth $\frac{5}{8}$ yard of satinet, and $\frac{1}{8}$ yd. of satinet is worth $\frac{1}{4}$ yd. of drilling, and $\frac{1}{4}$ yd. of drilling is worth $\frac{1}{16}$ yd. of silk, and $\frac{3}{4}$ yd. of silk is worth $\frac{1}{4}$ yd. of crape, and $\frac{1}{16}$ yd. of crape is worth $\frac{1}{2}$ yd. of kerseymere; how many yards of kerseymere must be given for 35 yards of broadcloth?

730. A field, in the form of an equilateral triangle, is enclosed by a fence 5 rails high, the rails being 11 feet long. It contains $\frac{1}{16}$ of an acre for every 3 rails in the fence. How many acres does it contain?

731. If a pipe $\frac{3}{4}$ inch in diameter will discharge a hhd. of water in 35 minutes, in how long a time will a pipe $1\frac{1}{2}$ inches in diameter discharge water sufficient to fill a circular cistern 10 feet in diameter and 12 feet deep?

732. I wish to divide a stick of timber, 50 ft. long, into 3 such parts that $\frac{1}{4}$ of the first, $\frac{1}{5}$ of the second, and $\frac{1}{6}$ of the third, shall be equal to each other. What must be the length of the parts?

733. By selling merchandise for \$2000, I lose 10 per cent. What do I lose in all?

734. The slant height of a truncated cone is 50 ft. The diameter of the lower base is 32 feet, and that of the upper base is 12 ft. What would be the height of the whole cone?

735. The wheel and axle used for raising heavy articles in a grocery-store are of the following dimensions: the wheel is 5 ft. and the axle 6 in. in diameter. The ropes are one inch in diameter. What power will balance a hhd. of molasses weighing 1100 lbs.?

736. If a clock were constructed to strike the number of hours in a week, instead of 12 hours, how many strokes would it strike in that time?

737. If a cannon of 4 inches calibre weighs 1500 lbs., what is the weight of a similar cannon of 7 inches calibre?

738. A man bought 4 kinds of apples, for which he paid \$4.41. For the first kind he gave 3 cents

each; he gave 13 cents for 7 of the second kind; for 5 of the first he gave as much as for 13 of the third kind, and he gave as much for 11 of the fourth kind as for 8 of the second. He bought 10 of the first kind as often as 4 of the second, 14 of the first as often as 13 of the third, and $5\frac{1}{2}$ of the fourth as often as 2 of the second. How many of each kind did he buy?

739. A steamship, sailing due east, traversed 7 degrees of longitude, from noon on Monday to noon on Tuesday. Allowing the degrees of longitude in her latitude to measure 50 miles, what was her exact speed per hour?

740. A certain square number is expressed in three parts, namely, the square of one portion of its root, twice the product of the two portions, and the square of the other portion. Now, the first two parts are 64 and 96. What is the number?

741. A merchant bought a quantity of flour, and sold $\frac{1}{4}$ of it at an advance of 10 per cent., $\frac{1}{4}$ of it at an advance of 8 per cent., $\frac{1}{4}$ of it at an advance of 6 per cent., and $\frac{1}{4}$ of it at a loss of 5 per cent. How should he sell the remainder to gain 6 per cent. on the whole?

742. The smaller of two similar marble monuments is 5 ft. high, and weighs 420 lbs. The larger is 8 ft. high. What is its weight?

743. In what time will \$350 amount to \$386, at 5 per cent. simple interest?

744. James Verry has a circular cistern 10 ft. in diameter at the top, and 9 ft. 9 in. at the bottom, and 9 ft. deep. What quantity of water will it hold?

745. A retailer of fruit bought, in the morning, 40 melons, 60 oranges, and 100 apples, for \$6.30; at noon, 10 melons, 40 oranges, and 80 apples, for \$2.60; and at night, 4 melons, 50 oranges, and 120 apples, for \$2.50, all at the same price. On his apples he made 100 per cent., on his oranges $33\frac{1}{3}$, and on his melons 25 per cent. What was his gain? And at what price did he sell each?

746. A truncated pyramid, containing $\frac{1}{8}$ of the whole pyramid, has the larger base 6 ft. square. What is the size of the other base?

747. If a mass of 160 bushels consists of corn and wheat in the proportion of 3 to 7, and a quantity of wheat be added and an equal quantity of corn be taken away, that the mass may remain the same and the proportion be made 4 to 11, what is the quantity of wheat added?

748. A certain carpenter is generally 25 per cent. behind his time. On the 21st of August, 1854, he commences building me a house, agreeing to have it finished on the 25th of May, 1855. At what time may I expect to see it finished?

749. A man, wishing to make a certain journey in a given number of days, travels 3 miles more each day than on the preceding. He travels 20 miles the first day, and 59 the last. What is the length of his journey?

750. A farmer insured his property in a mutual company, as follows: On his house \$1200, on furniture and provisions \$200, on his barn \$100, and on hay and grain \$100. He gave a note, for the premium, at 5 per cent., on which he paid 3 per cent. He also paid \$1 for the policy. At the end of three years he paid an assessment of 4 per cent. on his note. One year afterwards the whole was destroyed by fire, and the company paid him the whole amount insured, deducting $1\frac{1}{4}$ per cent. of his note for losses which had occurred subsequent to his last assessment. Allowing 6 per cent. simple interest on the money paid out, what did he save by effecting his insurance?

751. A hare runs 50 leaps, when a dog starts in pursuit. The hare makes 6 leaps while the dog makes 5, but 7 of the dog's leaps are equal to 9 of the hare's. How many leaps can the hare make before the dog will overtake her?

752. A's money was to B's as 7 to 9, but when each had earned \$20 A's was to B's as 13 to 16. What had each at first?

753. A merchant has a corn-bin capable of containing 1458 cubic feet, the width of which is to the height as 3 to 2, and the length 3 times the width. What are the dimensions of the bin?

754. How many men, in 12 days of 10 hours each, will do $\frac{1}{2}$ as much work as 20 men will do in 28 days of 11 hours each?

755. If an iron roller 6 inches in diameter contains 4 cubic feet, what must be the diameter of another of the same length to contain 24 cubic feet?

756. A man hires a flock of 450 sheep, and agrees to pay 8 per cent. annually for them, in kind. How many sheep should he return at the end of the 6 years?

757. If I exchange corn, worth 5s. cash, at 5s. 6d., for wheat worth 8s. cash, at 8s. 9d., do I gain or lose by the transaction, and what per cent.?

758. Bought goods to the amount of \$1000, on 6 months' credit; but, the seller offering to deduct 5 per cent. of the bill for cash down, or at the same rate for a shorter time, I paid him \$600 down, and \$200 at the end of 2 months. What was due at the end of the 6 months?

759. The diameter of the base of a cone is 24 ft. What must be the diameter of the base of a cone, taken from the top of it, containing $\frac{1}{4}$ as much?

760. A cable, 3 inches in diameter, consists of 1800 threads; how many such threads will be required to make a cable 5 inches in diameter?

761. A first cannon had been discharged 36 times, when a second commenced, and was discharged 8 times to the second's 7. The second, however, used as much powder for 3 shots as the first did for 4. How many shots did the second fire in order to burn as much powder as the first?

762. A merchant in New York wishes to remit to another in London \$4500. For what sum, English money, must his bill be drawn, bills on London being at a premium of 9 per cent., and the par value of the pound being $\$4.44\frac{1}{2}$?

763. I buy 200 books, and pay 1 cent for the first, and 3 for the second, and so on, in arithmetical progression. What do I pay for the whole?

764. A ship's chronometer, keeping Greenwich time, indicates 4 o'clock, 20 minutes, when the sun is on the ship's meridian. What is the longitude of the vessel?

765. If a cannon throwing an 18 lb. ball weighs 2060 lbs., what is the weight of a similar cannon throwing a 42 lb. ball?

766. A load of wood, 8 ft. long and 3 ft. 6 in. wide, at \$5.56 per cord, is worth \$6.99 $\frac{1}{4}$. What is its height?

767. If it requires 15 cwt. to bend a stick of timber, 7 by 10 inches, two inches when lying flatwise, what weight will bend it as much when placed on the edge, allowing the stiffness to vary as the width and the cube of the depth?

768. If air weighs $\frac{1}{16}$ of an ounce Av. per cubic foot, how much weight will a globular balloon 24 ft. in diameter, itself weighing 60 lbs., filled with gas weighing $\frac{1}{16}$ oz. per cubic foot, sustain?

769. Bought a farm for \$10,000, payable in one year, without interest. At the end of 2 months paid \$2000, at the end of 3 months paid \$1000, at the end of 5 months paid \$2000, at the end of 8 months paid \$1000, at the end of 10 months paid \$2000. What was due at the end of the year, allowing 6 per cent. per annum for the payment of money before it became due?

770. If a steamship sailing from Liverpool to New York traverses 8 degrees of longitude in 24 hours, what is the length of her day, from noon to noon?

771. The frustum of a cone is 26 ft. high, 10 ft. in diameter at the base, and 4 ft. at the top. How many feet in height must be cut from the top to contain 84 cubic feet?

772. With what velocity must a ship, weighing 1500 tons, move to have the same momentum as a 42 lb. shot moving at the rate of 1300 ft. per second?

773. The thickness of each of two grindstones is to its diameter as 3 to 16. The diameter of the smaller is 40 inches, and the other is 4 times as heavy. What is the diameter of the larger?

774. What would be the weight of a globe of lead 2 feet in diameter, its specific gravity being 11455?

775. What would be the weight of the globe described in the preceding question, at the distance of

17018 miles from the surface of the earth, allowing the diameter of the earth to be 7964 miles?

776. What are the dimensions of the largest rectangular block that can be cut from a sphere 24 inches in diameter, making the base a square, and the height equal to twice the side of the base?

777. "There is a box whose length is 72 inches, its breadth ** inches, and its depth 48 inches. What number of bushels will it hold?" In the above question as found in an old book, the number of inches in breadth was left out by the printer. The answer given is 96.428+ bushels. What, probably, was the breadth given by the author?

778. A man, by will, left his estate to his two sons and one daughter. To the eldest son he left $\frac{1}{3}$ of the estate and $\frac{1}{4}$ as much as to the daughter; to the younger son, $\frac{1}{3}$ of the whole and $\frac{1}{16}$ as much as to the daughter and to the daughter the remainder, which was \$100 less than the elder son's share. What was the whole estate?

779. If 12 men and 8 women can make 750 pairs of boots in 20 days, and 17 men and 6 women make 32 pairs in 7 days, how many pairs can 30 men and 1 woman make in 14 days?

780. A $\frac{1}{4}$ inch lead pipe is 84 rods long, and weighs 4093.4557125 lbs. What is its thickness, the specific gravity of the lead being 11400?

781. If I buy land for \$1000, and pay 6 per cent. compound interest for the money, and the value of the land increases 10 per cent. on what I pay for it, yearly, when should I sell it in order to realize the greatest possible profit?

782. A man bought a house-lot at 5 cents per square foot, and paid \$1125 for it. Had it been 8 feet wider it would have cost him \$1215. What was its size?

783. A western farmer uses a plough which cuts 4 furrows, of 15 inches each, at the same time. His team will walk 20 miles per day. How long will it take him to plough 100 acres?

784. Joseph Dow bought 2000 bushels of corn, at 82 cents per bushel, on 4 months' credit, and sold it, at the end of 2 months, to Eli Holmes for 92 cents per bushel, $\frac{1}{3}$ on 6 months' credit, $\frac{1}{3}$ on 3 months', and $\frac{1}{3}$ cash. Five months after the sale Holmes failed, and paid 65 cents on a dollar at once. Did Dow gain or lose by the transactions, and how much, money being worth 6 per cent.?

785. If I pay \$7.50 for $12\frac{1}{2}$ lbs. Av. of quicksilver, what should I pay for 36 lbs. Troy of the same?

786. A ship sails westerly from San Francisco, situated in longitude $122^{\circ} 14'$ west, until the chronometer, keeping San Francisco time, indicates half-past five P. M., when the sun is on the ship's meridian. What is the ship's longitude?

787. A man purchased 75 yds. of cloth, paying 4 cents for the first yard, and 8 for the second, and so on in arithmetical progression. What did his cloth cost him?

788. A cubical block of pine, containing 64 cubic feet, sinks to the depth of 2 feet $8\frac{3}{4}$ inches in pure water. To what depth will it sink in the Dead Sea, the specific gravity of the water of which is 1240.3?

789. For what sum must I give my note, at a bank, on 90 days, to receive the money requisite to pay for 400 bbls. of flour, at \$7.50 per bbl., on which the seller allows me 6 per cent. discount for cash?

790. Compound interest, at 6 per cent., for 6 years, is equivalent to what per cent. simple interest for the same time?

791. Corn and wheat are mixed together in a mass of 160 bushels, 7 parts wheat and 3 parts corn. How much wheat must be added, that there may be 11 parts of wheat for every 4 parts of corn?

792. The wheels of a railroad-car are $2\frac{1}{2}$ feet in diameter, and the car runs 36 miles per hour. How many revolutions do the wheels make per second?

793. The main-spring of a watch weighs about 32 grains Troy. What would be the value of 100 lbs. Av. of steel manufactured into watch-springs, allowing 50 per cent. for waste, and estimating them at 25 cents each?

794. A certain square number is to be expressed in three parts, viz., the square of one portion of its root, twice the product of the two portions, and the square of the second portion. The first part is 81, the third is 64. What is the second?

795. A stick of timber is 28 feet long, 14 inches wide, 12 inches thick at one end; and 4 at the other. How far from the thicker end must it be sawn in two, that it may be divided into two equal parts?

796. In how long a time will 5 per cent. compound interest be equal to 8 per cent. simple interest?

797. If the distance between two contiguous threads of a screw, measured in the direction of the axis, is $\frac{3}{4}$ of an inch, and the screw is turned, by a lever 10 feet long, with a force of 150 lbs., what force will be exerted by the screw, allowing $\frac{1}{4}$ the power for overcoming the friction?

798. What length of $\frac{3}{4}$ inch pipe, $\frac{1}{16}$ inch thick, can be made from a globe of lead 14 inches in diameter, allowing 4 per cent. for waste in manufacturing?

799. How many men, in 18 days of 12 hours each, will perform 4 times as much work as 32 boys will perform in 20 days of 9 hours each, 3 men being equal to 7 boys?

800. The first term of a geometrical series is 2, and the sixth 12872686. What is the 4th term?

801. James Adams owes Andrew Williams \$1400 to be paid in 30 days, \$650 to be paid in 40 days, \$500 to be paid in 60 days, and \$700 to be paid in 90 days. In how many days may the whole be cancelled by a single payment of \$3240, allowing 6 per cent. interest?

802. Three boys have, in all, 48 cents. John first gives William and Joseph respectively as much as they each have already; then William gives John and Joseph as much as they each have already, and at last Joseph gives John and William as much as they each have already, when they find they have equal sums. How many had each at first?

803. From a round log, 18 inches in diameter, I wish to cut the largest possible stick of timber, the sides of which shall be to each other as 2 to 1. What must be its dimensions?

804. If I have a note of \$1000 discounted at a bank in Boston on 90 days, and draw \$400 now, and the remainder in 30 days, to what per cent., paid at the end of the time, is it equivalent?

805. The length of a rectangular parallelogram is twice its breadth; and a line drawn from one angle to a point on the longer side, three fifths the distance from the adjacent to the opposite angle, is 122 feet long. How many square rods in the parallelogram?

806. \$725.

Boston, May 10th, 1851.

For value received I promise to pay John P. Whipple, or order, Seven Hundred and Twenty-five Dollars, with interest.

DAVID D. DANIELS.

On this note are the following indorsements:

July 4th, 1851, \$100.	Jan. 10th, 1853, \$50.
Dec. 16th, " 25.	July 4th, " 50.
May 1st, 1852, 50.	Feb. 16th, 1854, 200.
Sept. 10th, " 100.	April 1st, 1855, 200.

What was due June 10th, 1855?

807. The floor of a hall 72 feet 6 inches by 65 feet 4 inches is laid with boards $1\frac{1}{2}$ inches thick. How many feet of boards in the floor?

808. A merchant bought 2600 lbs. of sugar at 7 cents per pound, but lost 3 per cent. on the weight. At what price should he have sold it per pound to gain 10 per cent.?

809. From one side of a rectangular field 100 rods long I wish to cut off 5 acres by a straight line drawn so that the ends shall be to each other as 5 to 8. What will be the breadth of the two ends?

810. If 5 men and 8 boys can make 300 pairs of shoes in 6 days, and 6 men and 4 boys make 400 pairs in 8 days, how many pairs will 9 men and 12 boys make in 10 days?

811. A merchant bought 10,000 lbs. of sugar, at 7 cents per pound. How much of that that cost 5 cents per pound must he mix with it, that he may sell the whole at 7 cents and gain 10 per cent.?

812. What cost the 2 in. plank to make an uncovered cistern, 12 feet long, 6 feet wide, and 7 feet high inside, at 32 dollars per M., allowing 5 per cent. waste?

813. The circumference of the "old stone mill" at Newport, on the outside, is 72.2568 ft., and 58.805 ft. on the inside. What is its thickness?

814. A man has a rectangular piece of land, 20 rods long, containing 2 acres. He wishes to set it with plants 32 inches apart, no plant being nearer than 14 inches to the border. How many plants can he set?

815. The price paid for 50 books was in arithmetical progression. The price of the fifth was 11 cents, and that of the fortieth was 81 cents. What was the price of all of them?

816. What sum should be insured on a vessel and cargo, valued at \$80,000, at $4\frac{1}{2}$ per cent., in order to include the value of the property and the premium?

817. A grocer sold sugar for $7\frac{1}{2}$ cents per pound, by which he cleared $\frac{1}{3}$ of the money received. He afterwards sold it at $7\frac{1}{2}$ cents. What did he gain per cent. on the last?

818. A ship sails from Boston. At the end of two weeks the captain finds that, when the sun is on his meridian, his chronometer, keeping Boston time, indicates $\frac{1}{4}$ past 10 A. M. What is his longitude, the longitude of Boston being $71^{\circ} 4' W.$?

819. If a stick of timber, 1 ft. 2 in. thick, and 1 ft. 6 in. wide, contains $60\frac{3}{4}$ cubic feet, what is its length?

820. Henry Smith bought a lot of lumber for \$3500, and hired the money at a bank at 6 per cent., on terms of 60 days, to pay for it. At the expiration of 120 days he sold it for \$3650 on 90 days, and on the same day had the note received discounted at the bank and paid his own note. Did he gain or lose by the transactions, and how much?

821. Divide £819, 6s., 9d., among 8 men and 12 boys, giving each man $\frac{1}{2}$ as much as each boy.

822. Sold $\frac{1}{2}$ of a quantity of cloth for the cost of $\frac{2}{3}$ of the same, and afterwards sold $\frac{1}{2}$ of the remainder for $\frac{1}{2}$ of what I sold the first for, and finally sold the remainder at cost. What did I gain per cent.?

823. Fourteen rods, 12 feet to the mile, is what per cent.?

824. I sell cloth at \$2.50 cash, or \$3 barter. What should I charge when my customer pays $\frac{1}{2}$ cash and $\frac{1}{2}$ in corn?

825. The perpendicular distance between two contiguous threads of a screw is $\frac{1}{4}$ of an inch, and it is turned by a lever in such a manner that the power describes a circle the radius of which is 15 feet. If a power of 300 lbs. is applied, what force will be exerted by the screw, allowing $\frac{1}{2}$ of the power for overcoming the friction?

826. A man bought 2000 bushels of wheat, at \$1.50 per bushel, but, in measuring it out, found it to hold

out $1\frac{1}{2}$ per cent. more than when he bought it. He sold it for \$1.56 per bushel. What did he gain per cent.?

827. John's marbles were to William's as 2 to 3; but when each had lost 8, John's were to William's as 4 to 7. How many had each at first?

828. A stick of timber is 12 inches square at one end and 4 inches at the other, and contains $13\frac{1}{2}$ cubic feet. What is its length?

829. A had \$700, and B had 10 per cent. more. But when B had paid a portion of his to A, A had \$45 more than 50 per cent. more than B. How much did B pay A?

830. \$778.16 is received as the amount of a note at 8 per cent. per annum for 1 year, 2 months, 12 days. What is the note?

831. A commission merchant buys for me 1000 bbls. of flour for \$6.50 per barrel, and 15 days afterwards sells the same for \$6.75 per bbl. Money being worth 6 per cent., and allowing him 1 per cent. for buying and $1\frac{1}{2}$ per cent. for selling, do I gain or lose by the transaction, and how much?

832. A merchant in Boston has in his hands \$2500 belonging to a merchant in London. For what amount should he send him a draft on Liverpool when bills on the latter are at a premium of $9\frac{1}{2}$ per cent.?

833. A man hired \$200, and agreed to pay 10 per cent. compound interest, and to pay the whole, includ-

ing interest, in 3 equal annual instalments. What was the amount of each payment?

834. The longitude of Boston being $71^{\circ} 4'$ W., and that of San Francisco $122^{\circ} 14'$ W., when it is 12 o'clock M. at Boston, what is the time at San Francisco?

835. A house is 38 ft. long and 32 ft. wide, and 28 ft. high in all, the ridge rising 9 ft. above the beam. It has two doors 4 by 7 ft., and 24 windows 3 by 6 ft. How many clapboards, 4 ft. long, laid out 4 inches, will be required to cover it, allowing the waste to be equal to the space occupied by the trimmings?

836. How many shingles, averaging 4 inches wide, laid out 4 inches, will be required to cover the roof of the house described in the last question, the roof projecting over the ends 18 inches, and over the sides 2 ft.?

837. A straight line 2 ft. long passing through a sphere, and terminated by the surface, passes 5 inches beneath that surface. How many cubic feet in the sphere?

838. How shall I sell flour, which I bought 10 months ago on 4 months, for \$8.50 per barrel, so as to lose 10 per cent. when money is worth 8 per cent.?

839. Supposing the earth a perfect sphere 7964 miles in diameter, and a straight line 800 miles long to

pass through it so as to be terminated by the circumference, how far below the surface will it pass?

840. A man bought some sheep for \$50. If he had bought 6 less for the same sum, the price per sheep would have been once and a half the price actually paid. What did he pay each for them?

841. A merchant bought a quantity of sugar at 6 cents per lb., and $\frac{5}{8}$ as much coffee at 11 cents, and, the same day, sold $\frac{1}{4}$ of his sugar and $\frac{2}{3}$ of his coffee for \$54, and gained 20 per cent. How many lbs. of each did he buy?

842. If the largest cube possible be cut from a sphere 54 inches in diameter, and the largest sphere possible be cut from that cube, what will be the diameter of the last sphere?

843. What must be the inside dimensions of a box, the length, breadth, and depth of which shall be to each other as 4, 3, and 2, that shall contain 3000 cubic feet?

844. With a screw, the perpendicular distance between the contiguous threads of which is $\frac{1}{4}$ inch, it is necessary to raise a weight of 65000 lbs. by the application of 54 lbs. power. Allowing $\frac{1}{4}$ of the power for overcoming the friction, what must be the length of the lever?

845. What is the amount of one dollar for 168 years, compound interest, allowing it to double once in 12 years?

846. A boy bought some oranges at 2 cents each, and $\frac{3}{4}$ as many more at 3 cents each, and sold them all at the rate of 2 for 5 cents, and gained 50 cents. How many oranges did he buy?

847. If a young mechanic deposits in a savings bank, that pays 6 per cent. compound interest, \$125 annually for 15 years, what will be due him at the time of making the last deposit?

848. A hydraulic ram forces into a gentleman's house a stream of water from a quarter inch pipe at the rate of 16 inches per second. From a reservoir in the house a pipe leads to his garden, where it supplies a fountain from a $\frac{1}{8}$ inch pipe at the rate of 25 feet per second. What quantity of water will remain per day for other uses?

849. A man has a rectangular garden containing 21600 square feet. Wishing to enlarge it by the addition of 10 feet on all sides, he finds he must purchase 6400 square feet more. What are the dimensions of the garden?

850. A man, during one year, spent his whole income and a sum equal to $\frac{1}{4}$ of it besides. He then found that, by saving $\frac{1}{8}$ of it each year for 5 years, he could make good the deficiency and save \$150 besides. What was his income?

851. Two brothers, John and Edwin, sold their interest in an estate for \$10,000 each. John took a note for his, on demand, with interest at 6 per cent., for

the \$10,000; but Edwin took a note for \$10,600, payable in one year, with interest afterwards. Now, if, at the end of 6 months, they wish to invest their money in bank stock, and John collects his, and Edwin receives the then present worth of his note, which will receive the more, and how much more?

852. If they collect their notes at the end of two years, which will receive the more, and how much more?

853. A weight of 250 lbs. rests on a lever 10 feet long, 7 feet from one end, the two ends of the lever being supported by props. How much of the weight does each prop sustain?

854. There is a pyramid the base of which is an equilateral triangle, one side of which is 20 feet, and its perpendicular height is 50 feet. How many cubic feet does it contain?

855. The capital stock of a bank is divided into 500 equal shares, and owned equally by 50 persons. A sells 4 shares; then B sells 6 shares to the company, and afterwards buys 2 shares of A; then C sells 4 shares to the company, and afterwards A buys one share of B. What part of the capital stock does A then own?

856. I wish to make a square cistern, the depth of which shall be equal to twice the length of the side, that shall hold 40 hhds. What must be the length of one side?

857. If 2 rods of iron fence weigh 75 lbs. when the wire is $\frac{1}{16}$ inch in diameter, what will be the cost of 70 rods of the fence when the wire is $\frac{1}{8}$ inch in diameter, if it is sold at $6\frac{1}{2}$ cents per pound?

858. Bought 7 hhds. of alcohol, at $62\frac{1}{2}$ cents per gallon, cash, and, having kept it 2 months, sold it on 6 months' credit, at 80 cents per gallon. What was my cash gain at the time of sale, interest being 6 per cent. per annum?

859. A receives 60 bbls. of pork from B, 50 from C, and 75 from D, to be sold on commission. On inspection, it is found that C's is 15 per cent. better than D's, and that B's is 10 per cent. better than C's. A sells the whole together at \$14 per bbl., and charges 4 per cent. commission. What should he remit to each?

860. What is the length of a pile of wood $3\frac{1}{2}$ feet wide, and $5\frac{1}{2}$ feet high, which, being paid for at the rate of $5\frac{1}{2}$ dollars per cord, comes to \$432.50?

861. Thirty workmen agree to work 10 hours per day for 13 days, for \$500 paid in advance; but, when they had worked $8\frac{1}{2}$ hours per day for 12 days, 6 of them agree to do the remaining work in 12 days. How many hours per day must they work?

862. Divide \$250 among 4 men, A, B, C, and D, so that as often as A has $\frac{1}{16}$ of an eagle, B shall have $\frac{1}{4}$ of a dollar, C shall have $\frac{1}{2}$ of a dime, and D $\frac{1}{4}$ of a cent.

863. What cost $36\frac{1}{2}$ lbs. of beef, if $\frac{1}{12}$ of a lb. cost $3\frac{1}{10}$ cents?

864. A merchant in New York has sold, on commission, a consignment of laces for a merchant of Paris. He has received \$8640.25, and charges 8 per cent. commission for selling, and remits the remainder per bill on Paris, when bills on Paris are $2\frac{1}{2}$ per cent. below par. What is the amount of the bill, the par value of the franc being $18\frac{1}{2}$ cents?

865. Pure water is composed of 8 parts of oxygen and 1 part of hydrogen, by weight. What is the weight of each in a hhd. of water?

866. I have a field in the form of a rectangular parallelogram, the sides of which are 40 and 70 rods. I wish to cut off 3 acres by a line drawn from a point on the shorter side, 6 rods from one corner, to the opposite side. How far from the adjacent corner will the line fall?

867. A grocer bought in the course of a year 7460 gallons of milk, beer measure, for 18 cents per gallon, and sold it to his customers at 5 cents per quart, wine measure. One quart in 20 soured on his hands, which he was obliged to sell at 2 cents per qt. What did he gain on the whole?

868. What must be the circumference of a globe that shall contain 64 times as many cubic inches as one 7 inches in diameter?

869. Samuel Colt and John Williams commenced business with the same capital. Colt gained \$1400, and

Williams lost 15 per cent. of his stock, when it appeared that Colt had 65 per cent. more than Williams. What was the capital of each at first?

870. James Colwell demanded for goods 22 per cent. profit, but afterwards abated 14 per cent. of his price, and sold them. He gained \$225. What did the goods cost him?

871. The pipe of an aqueduct, 10 inches in diameter, is divided into two branches, the united capacity of which is equal to that of the first. The diameter of one of them is 8 inches. What is that of the other?

872. The length of a rectangular field, containing 8 acres, is twice its width. What is the length of its diagonal?

873. If 6 histories are worth 5 arithmetics, and 12 arithmetics are worth 5 dictionaries, and 2 dictionaries are worth 7 testaments, and 20 testaments are worth 17 readers, and 45 readers are worth 36 geographies, and 12 geographies are worth 11 algebras, and 22 algebras are worth 7 reams of paper, and 5 reams of paper are worth 62 slates, and 17 slates are worth 32 inkstands, and 31 inkstands are worth 120 pencils, and 196 pencils are worth \$4.50, how many histories can be bought for \$12?

874. A man, wishing to sell a farm, has two offers. The one, \$7705: viz., \$3365 cash, and \$4340 at the end of 8 years, or the present worth of the last down, allowing interest to be 5 per cent. per annum. The other, a sum to be paid $\frac{1}{2}$ at the end of 2 years, $\frac{1}{2}$ at the end of

4 years, and $\frac{1}{4}$ at the end of 6 years, or the present worth of the whole down, allowing interest to be 5 per cent. These two offers are equivalent to each other. What was the sum the last offered to pay in the three instalments?

875. If a bar of lead $2\frac{1}{2}$ feet long, 2 inches wide, and $1\frac{1}{4}$ inches thick, weighs 38 lbs., what will one $4\frac{1}{4}$ feet long, 5 inches wide, and $1\frac{1}{4}$ inches thick, weigh?

876. A cistern, containing 210 gallons, is supplied by 2 pipes. It is found that, when the first pipe is open 4 hours and the second 5, 90 gallons of water are obtained. By a second experiment it appears that, when the first is open 7 hours and the other $3\frac{1}{2}$, 126 gallons are obtained. How many gallons does each pipe supply in an hour?

877. Divide the number 237 into two such parts that the one may be contained in the other $1\frac{1}{4}$ times. What are the parts?

878. The thickness of the smaller of two grindstones is to that of the larger as 5 to 8; and the specific gravity of the smaller is to that of the larger as 15 to 16. The diameter of the smaller is 3 feet, 6 inches; and the weight of the larger is $4\frac{1}{2}$ times that of the smaller. What is the diameter of the larger?

879. If I sell $\frac{1}{4}$ of my stock of goods for 25 per cent. more than the cost, and the remainder for 40 per cent. less than cost, what do I gain per cent.?

880. What number is that whose square, multiplied by its third part, gives 1944?

881. What must be the diameter of a globe that shall contain 8 times as many cubic feet as one 24 feet in circumference?

882. If 3600 bushels of corn, weighing 56 lbs. to the bushel, will supply a garrison of 2000 men, 7 months of $4\frac{1}{2}$ weeks each, with 3 meals per day, 18 oz. of bread to the meal; how many bushels, weighing 62 lbs. to the bushel, will supply 1250 men, 9 months of $4\frac{1}{2}$ weeks each, with 2 meals per day, of 16 oz. each?

883. How much more land in a square circumscribed around a circle 25 rods in diameter, than in the square inscribed in the same circle?

884. A broker lent a man \$600, and took a note for \$800, payable in 3 years, without interest. What per cent. compound interest did he charge?

885. Ten men, 6 women, and 12 children, are to share an estate so that each child shall receive $\frac{2}{3}$ as much as each woman, and each man $4\frac{1}{2}$ times as much as each child. The estate is valued at \$7560. What is the share of each?

886. A cistern has 2 pipes by which the water is introduced. The first will fill $\frac{1}{2}$ of it in $4\frac{1}{2}$ hours, and the second will fill $\frac{1}{3}$ of it in $5\frac{1}{2}$ hours. The cistern

has a leak which would empty $\frac{2}{3}$ of it in $10\frac{1}{2}$ hours. How long will it take the two pipes to fill it?

887. When may a debt of \$25 due in 30 days, one of \$50 due in 60 days, one of \$75 due in 90 days, and one of \$100 due in 120 days, be cancelled by a single payment of \$260, allowing 6 per cent. per annum interest?

888. A man has a rectangular garden 120 ft. long and 85 ft. wide, the surface of which he wishes to raise 4 inches by means of earth taken from a ditch, in the border, 4 ft. wide. He finds that the earth taken from the ditch occupies 8 per cent. less space after its removal than before. What must be the depth of the ditch?

889. A's money was to B's as 6 to 7; but when A had spent \$20, and B \$15, A's was to B's as 4 to 5. What had each at first?

890. A $1\frac{1}{2}$ inch pipe of lead is to be laid 84 rods long, and the pipe is to be $\frac{1}{16}$ in. thick. The specific gravity of the lead is 11400. What is the weight of the pipe?

891. A and B together had \$9800; and when A had invested $\frac{1}{3}$ of his, and B $\frac{1}{4}$ of his, they had equal sums remaining. How much had each at first?

892. James Johnson bought the following bills of goods on credit, as specified:

April 10th, 1855,	\$1100	on 6 months.
May 8th, "	600	" 6 "
June 12th, "	375	" 5 "
July 10th, "	750	" 6 "
Aug. 20th, "	650	" 6 "
Sept. 1st, "	500	" 5 "

Sept. 20th, he wishes to give one note for the whole.
What credit should be allowed him on the note?

893. A straight line passing through a globe 4 in. from its centre, and terminated by the surface, is 3 ft. 6 in. long. What is the solidity of the globe?

894. What is the amount of \$500 for 6 years, at 6 per cent. per annum, the interest being compounded semi-annually?

895. In a shower $\frac{3}{4}$ of an inch of rain fell perpendicularly. How much water fell on a roof 44 ft. long and 22 ft. wide, one edge being elevated 10 ft.?

896. A trader sold goods for \$720, by which, after allowing 8 per cent. discount, he gained $12\frac{1}{2}$ per cent. What did the goods cost him?

897. A person, being asked the time of day, said that $\frac{3}{4}$ the time past midnight, added to $\frac{3}{4}$ the time to noon, would give the exact time. What was the time?

898. Bought goods to the amount of \$2500, on 6 months; but, the seller offering to deduct 5 per cent.

for cash, I hired the requisite money at a bank at 6 per cent., paying $\frac{1}{4}$ per cent. bonus, and paid the bill. What was my gain by so doing, at the end of the 6 months?

899. If 46 is divided into two parts, so that, when one part is divided by 7 and the other by 3, the sum of the quotients shall be 10, what will the parts be?

900. Received, as the amount of a note of \$710, for 1 year, 2 months, and 12 days, \$778.16. What was the rate per cent.?

901. A stone, in the form of a truncated wedge, is 12 ft. long, 4 ft. wide, and 3 ft. 2 in. thick at one end, and 1 ft. 6 in. at the other. What is its entire surface?

902. A $1\frac{1}{2}$ in. lead pipe, $\frac{1}{16}$ in. thick, is 84 rods long, and weighs 4093.4557125 lbs. What is the specific gravity of the lead?

903. William Allen sold goods for \$175 more than they cost him, by which he made 14 per cent. What did the goods cost him?

904. A lever 14 feet long has a weight of 60 lbs. attached to one end, and 40 to the other. At what distance between them should a prop be placed, to produce equilibrium?

905. Said A to B folding his sheep, "You have a hundred fine lambs." "No," said B, "but if I had $\frac{1}{4}$ as many more as I now have, and 5 lambs and $\frac{1}{2}$, I should have a hundred." How many had he?

906. Wishing to ascertain the quantity of land in a field in the form of a trapezium, I measured one of the diagonals, and found it $62\frac{1}{2}$ rods. I then measured the perpendicular distance from the other two corners to that diagonal, and found them to be $21\frac{1}{2}$ and $14\frac{1}{2}$ rods. How many acres in the field?

907. If a pipe $1\frac{1}{2}$ in. in diameter will fill a cistern in 7 hours, in what time will it fill the cistern when a pipe $\frac{5}{8}$ of an inch in diameter is carrying off the water with an average velocity which is to that of the first as 5 to 4?

908. What is the difference between the area of a circle 10 rods in diameter, and that of its circumscribed square?

909. Let a man \$10000 for 6 years, and at the end of the time received \$13400.96. What was the rate per cent. compound interest?

910. Wishing to ascertain the specific gravity of a piece of wood, I find it to weigh in the air 36 lbs. I then attach to it a piece of iron that weighs 49 lbs. in the air and 41 in the water, and find them both to weigh 16 lbs. in the water. What is the specific gravity of the wood?

911. A tin-worker wishes to make a kettle, the diameter of the top of which shall be to that of the bottom as 7 to 5, the depth of which shall be 14 in., which shall hold 16 gallons of water. What must be the diameter of the top?

912. An estate of \$90 per annum, to commence 10 years hence, is to be sold. What is its present value, allowing 6 per cent. compound interest?

913. H. L. Ballou and Co. bought 2000 bbls. of flour, Jan. 3d, 1856, at \$8 per bbl., on board of a ship about to sail for Liverpool, and gave their note for the amount payable in 6 months, without interest. Jan. 10th, they got it insured for \$16000, and paid $1\frac{1}{4}$ per cent. premium, and one dollar for the policy. Jan. 24th, they received intelligence of the loss of the ship and cargo; and Feb. 24th, the insurance company paid them the amount insured. On settlement at the end of the 6 months, what was their gain, allowing 6 per cent. per annum for the use of money?

914. A man, whose weight was 220 lbs., wishing to ascertain the weight of a stick of timber of uniform size, 24 feet long, placed a prop under it 15 feet from one end, and then found that he must stand upon it 3 feet, 7 inches, from the other end, to balance it. What was its weight?

915. A lot of land, containing 10 acres, is 20 rods wide, and is a plane inclined in the direction of its length. One end is 140 feet above the other. How many square feet of surface does it contain?

916. There are 4 pieces of cloth. The length of the first is to that of the second as 2 to 3; the length of the third is to that of the second as 5 to 7; and the

length of the 4th is to that of the 1st and 2d as 4 to 5. The cost of the 1st per yd. is to that of the 3d as 3 to 4, the cost of the 2d per yd. is to that of the 1st as 2 to 5, and the cost of the 1st per yd. is to that of the 4th as 10 to 7. The cost of the 4th piece per yd. was as many cents as there were yds. in the piece, and the cost of all four pieces was \$223.20. How many yds. in each piece? and what was the cost per yd.?

917. An importer sold a quantity of goods to a wholesale merchant, and gained 10 per cent.; the wholesale merchant sold it to a retailer at an advance of $12\frac{1}{2}$ per cent.; and the retailer sold it for \$773.43 $\frac{1}{2}$, and gained 25 per cent. What did it cost the importer?

918. If water is discharged from an inch pipe with a velocity of 24 feet per second, what quantity would be discharged from $\frac{1}{2}$ past 2 o'clock P. M., of July 4th, 1856, to 20 minutes past 10 A. M., of the 10th of the following Sept.?

919. The product of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ of a certain number, increased by 48, gives 4656. What is the number?

920. The population of London, in 1851, is said to have been 2,362,000. Now, if, in marching out of the city in single file, each person occupies a space of $2\frac{1}{2}$ feet in the procession, and the procession moves with a speed of 3 miles per hour, without intermission, how long a time will be required for that number of persons to pass out in such a procession?

921. I bought cloth for \$2.40 per yard, but find I lose 5 per cent. on the measure. At what price per yard should I sell it that I may allow 5 per cent. of my sales for bad debts, and still gain 10 per cent.?

922. If I hire of John Cole \$10,000, and agree to pay him 6 per cent. at the end of each year for the use of it, and he calls for it at the end of 18 months, I having paid him the first year's interest according to agreement, how much is strictly due him?

923. If the 4th power of a certain number be divided by $\frac{1}{4}$ of that number, and 167 be subtracted from that quotient, the remainder will be 12000. What is the number?

924. Moses Aldrich sells flour for \$8.75 per bbl. cash, and \$9.25 barter. John Mason wishes to purchase a bbl., and proposes to pay $\frac{3}{4}$ cash, and the remainder in produce. What should be the price of the flour?

925. Suppose that at each stroke of the piston of an air-pump 10 per cent. of the air in the receiver is exhausted, how many strokes will be necessary in order that less than 5 per cent. of the air may remain in the receiver?

926. What must be the circumference of a circle that shall contain 16 times the area of one 10 feet in diameter?

927. A person has \$6500 which he wishes to invest in bank stock. How much can he purchase at $4\frac{1}{2}$ per cent. above par, if he pays $\frac{1}{4}$ per cent. brokerage?

928. A vessel sailed out of the Mississippi river into the Gulf of Mexico, when it was found necessary to add 60 tons freight to sink it to the water line marked in the river. Now, by the hydrometer, the specific gravity of the fresh water is found to be 1003, and that of the water of the gulf 1026.2. What was the weight of the vessel and cargo at first?

929. How much more land in a square circumscribed around a circle 50 rods in diameter, than in a regular octagon circumscribed around the same circle?

930. How many cubic quarter inches are there in a cubic inch?

931. John Williams bought a stock of goods for 75 per cent. of their real value, and sold them to Amos Wood so as to gain 15 per cent. Amos Wood sold them to Paul Johnson for 10 per cent. less than their real value, and gained \$250 by the transaction. What did John Williams pay for the goods?

932. At the time of his marriage a man was three times as old as his wife, but when they had been married 18 years he was only twice as old. At what age was each married?

933. If 750 lbs. of sugar cost \$37.50, for how much must I sell 525 lbs. in order to gain the cost of 25 lbs.?

934. Two men start from the same point, at the same time, to travel in the same direction. A travels at the rate of 6 miles per hour. At the end of 4 hours A turns and travels back as far as B has travelled during the 4 hours, then turns and travels in the first direction again, and overtakes B at the end of 18 hours. What is B's rate per hour?

935. A man has a field, two sides of which are parallel, one of which is 50 rods long, and the other 30. The other two sides make the same angle with the base, and are each 75 rods long. How many acres in the field?

936. James Ayer bought a horse for \$150, kept him one year at a cost of \$50, let him enough to come to \$75, and then sold him for a note of \$200, which he was glad to sell at a discount of 20 per cent., and wait one year for his pay. What was his gain at the time of receiving his pay for the note, reckoning 6 per cent. compound interest?

937. How many feet of boards are there in a floor 16 feet 6 inches long, 14 feet 9 inches wide, and $1\frac{1}{4}$ inches thick?

938. A's money was to B's as 5 to 7; but A having spent 10 dollars, and B 18 dollars, A's is to B's as 10 to 13. What had each at first?

939. A round log is 28 inches in diameter at one end, and 15 at the other, of a true taper. What must be the diameter of the transverse section that cuts it into two equal parts?

940. Suppose a canal is 60 feet wide at the surface of the water, and 54 at the bottom, and the water is 6 feet deep, and, in consequence of boats passing the locks, has a velocity of $\frac{1}{4}$ mile per hour, how long will a cubic furlong of water supply it?

941. If a weight of 10 lbs. will bend a board, one inch thick and 14 inches wide, 4 inches when lying flatwise, what weight will be required to bend the same board as much when placed on the edge, allowing the stiffness to vary as stated in number 767?

942. A man has \$20,000 in a savings bank that pays 6 per cent. annually. What will remain at the end of 7 years, if he withdraws \$500 at the end of each year for his living?

943. A and B enter into partnership. A at first puts in \$500, and at the end of 8 months puts in \$100 more. B at first puts in \$800, and at the end of 4 months takes out \$200. At the end of 18 months they find their gain to be \$1400. What is each one's share of the gain?

944. Bought eggs at the rate of 5 for 7 cents, and sold them at the rate of 7 for 10 cents, and gained \$15.75. How many did I sell?

945. There is a field, in the form of a rectangular parallelogram, containing 29 acres and 4 square rods, one side of which is 32 rods longer than the other. What is the length of each side?

946. If a certain number be divided by 7, the quotient multiplied by 3, that product divided by 5, 20 be subtracted from that quotient, 30 be added to the remainder, and the sum be divided by 2, the quotient will be 65. What is the number?

947. John Chace can reap a certain field of wheat in 6 days by working 10 hours per day, and his son Sidney can reap the same field in 8 days by working $9\frac{1}{2}$ hours per day. In how many days can they both reap it, working 8 hours per day?

948. Bought a bankrupt stock of goods for \$5600 cash, and sold the same immediately for \$7000 on 6 months' credit. If I have the note discounted at a bank at 6 per cent. per annum, what do I gain?

949. What number is that whose 7th part and 8th part multiplied together, and that product divided by 3, will give the quotient $298\frac{1}{3}$?

950. The United States' merchant tonnage is estimated at 5,400,000 tons. Suppose the vessels average 600 tons, and average 120 feet in length, and are arranged at equal distances from each other and the land, on the route from New York to Liverpool, the distance being 3200 miles. How far will it be from the stem of one to the stern of the preceding?

951. A person agreed to pay \$800 in instalments, the first of which was to be \$20, and the last \$80, increasing by a constant quantity from the first to the last. How many instalments were there, and what was the difference between the successive payments?

952. Bought 500 bbls. of flour at \$8.50 per bbl., and asked for it 10 per cent. more than it cost me, but, being pressed for money, sold it for $12\frac{1}{2}$ per cent. less than my asking price. What did I lose by the transaction?

953. I bought a cask of nails, containing 100 lbs., at $4\frac{1}{2}$ cents per pound, and, after reserving 5 lbs. for my own use, sold the remainder at $5\frac{1}{4}$ cents per pound. What did I gain?

954. Which is most valuable, a term of 15 years, commencing at the present time, in an estate of \$100 per annum, or the reversion of the same forever after the 15 years, allowing 5 per cent. compound interest? What is the difference?

955. Bought corn at 55 cents, 65 cents, and 70 cents, per bushel. - In what proportion may I mix them so as to sell the mixture at 78 cents per bushel, on 6 months' credit, when money is worth 8 per cent. per annum, and make a present gain of 20 per cent.?

956. Divide 160 into 4 such parts that, the first being diminished by 3, the second increased by 3, the third divided by 3, and the fourth multiplied by 3, the remainder, sum, quotient, and product, will be equal to each other. What will be the numbers?

957. A man bought a farm for \$2400, and agreed to give 6 notes for it, payable one at the end of each year, with simple interest at 6 per cent. per annum, for such sums that the amount of all of them should be divided equally among them. For what sums should the notes be given?

958. Two boys have the same number of cents each. If A had $16\frac{1}{2}$ more, and B $18\frac{1}{2}$ less, A would have 3 times as many as B. How many have they each?

959. A grocer sold 2500 gallons of molasses for \$1000, and gained on each gallon $\frac{1}{2}$ the cost of a beer quart. What did it cost him per gallon?

960. What is the difference between the interest of \$2500 for $5\frac{1}{2}$ years at 5 per cent., and the interest of twice that sum for $\frac{1}{2}$ the time at double the rate?

961. An ingenious blacksmith, wishing to ascertain the weight of a piece of work, and having no apparatus fitted for the purpose except a quantity of weights, balanced a bar of iron over a sharp edge, and attached the work to one end and weights to the other, and found that it appeared to weigh $42\frac{1}{2}$ pounds. He then attached the work and weights to the opposite ends, and found that it appeared to weigh $54\frac{1}{2}$ pounds. What was the true weight of the work?

963. Paid \$30.96 for 5 pieces of cloth. The number of yards in the first piece was equal to $\frac{3}{4}$ the number in the second, the number in the second equalled $\frac{3}{4}$ the number in the fifth, the number in the third equalled $\frac{3}{4}$ the number in the fourth, and the number in the fourth equalled 4 times the number in the first. For the first I paid twice as many cents per yard as there were yards in the piece; for the second, $\frac{3}{4}$ as much per yard as for the first; for the third, $\frac{1}{2}$ as much per yard as for the fourth; for the fifth, $\frac{1}{2}$ as much per yard as for the second; and for the fourth, $1\frac{1}{2}$ times as much per yard as for the first. How many yards in each piece?

963. In a mass of lead and pewter, weighing 150 lbs., the specific gravity of which is 8420, what is the weight of pewter, the specific gravity of the lead being 11410, and that of the pewter 7471?

964. If flour that cost \$6.50 is sold, on 6 months' credit, at \$7.50, on what credit should cloth costing \$2.50 per yard be sold at \$3.25, allowing $\frac{1}{2}$ the profit to balance the credit?

965. On a note of \$710, \$778.16 was received as the amount, at 8 per cent. per annum. What was the time?

966. A vessel sails out of salt water, the specific gravity of which is 1026, into fresh water, the specific gravity of which is 1002, when it is found that $18\frac{1}{2}$ tons of the cargo must be discharged in order that the ves

sel may sink just as deep only in the latter as in the former. How much did the vessel and cargo weigh at first?

967. A person has two pieces of iron. Two fifths of the first piece weigh 96 pounds less than $\frac{1}{4}$ of the second, and $\frac{1}{4}$ of the second piece weigh exactly as much as $\frac{1}{4}$ of the first. What does each weigh?

968. A merchant in Boston ships a quantity of flour to Liverpool, which sells there for £800, after paying all expenses to be paid there. For what sum should he sell in Boston his bill of exchange on Liverpool for the amount, exchange being $7\frac{1}{2}$ per cent. advance?

969. What shall I ask for flour that cost \$6.75, that I may fall 10 per cent. on the price, and still gain 10 per cent.?

970. A man hires \$5000 at a bank in Boston on 90 days, invests the money received, after paying the interest, in flour in Albany, at \$8.50 per bbl., including freight to Boston, allowing his factor in Albany $\frac{1}{4}$ of one per cent. commission. At the end of 2 months he sells his flour on 90 days' credit for \$9.25 per bbl., and, when his note at the bank matures, gets the note received for the flour discounted, and pays his own. What has he gained by these transactions?

971. Five men can make 36 pairs of shoes while 4 men are making 15 pairs of boots, and 7 men make 84 pairs of boots in 6 days by working 10 hours per day.

How many hours per day must 3 men work to make 75 pairs of shoes in 5 days?

972. Thirty per cent. of a note that I take for goods is gain, but I am obliged to sell that note at a discount of 15 per cent. What do I gain per cent.?

973. Two adjacent angles of a quadrilateral field are right angles. The difference between the opposite sides adjacent to those angles is 20 rods. The length of the side between the right angles exceeds the length of the longer of the adjacent sides by 20 rods. The area of the field is 25 acres. What are the dimensions of the sides mentioned?

974. If $62\frac{1}{2}$ bushels of oats that weigh 32 lbs. per bushel are equivalent to 40 bushels of corn that weighs 52 lbs. per bushel, how many bushels of oats that weigh $34\frac{1}{2}$ lbs. per bushel will be equivalent to 95 bushels of corn that weighs $55\frac{1}{2}$ lbs. per bushel?

975. A man sold 25 bushels of wheat and 30 bushels of rye for \$79.75. He sold the wheat for 55 cents per bushel more than the rye. What was the price of each per bushel?

976. What must be the diameter of a circle that shall contain 25 times the area of one 36 feet in circumference?

977. What per cent. over the cost of his goods should a merchant charge, so that, allowing he keeps

them, on an average, 3 months, and sells $\frac{1}{2}$ for cash down, and the other $\frac{1}{2}$ on an average credit of 6 months, and loses 5 per cent. of his debts, and pays, in advance, expenses equal to 4 per cent. of the original cost of the goods, he may gain 10 per cent. at the time of sale on the money laid out, money being worth 6 per cent. per annum?

978. A sold a quantity of cloth at a loss of 6 per cent., and B sold what cost him the same money at a profit of 10 per cent. Now, B received \$64 more than A. What did A receive?

979. A teacher, being questioned as to the number of scholars in his school, said: "My class in reading comprises my whole school; my class in arithmetic, $\frac{3}{4}$ of my school; my class in grammar, $\frac{1}{2}$ my school; my class in geography, $\frac{1}{3}$ of my school; my class in history, $\frac{1}{4}$ of my school; my class in composition, $\frac{1}{5}$ of my school; my class in philosophy, $\frac{1}{6}$ of my school; my class in algebra, $\frac{1}{7}$ of my school, and I have 18 in my class in chemistry. Now, $\frac{1}{2}$ my scholars are in 4 classes each, and the other half in 3 each." How many pupils were there in his school?

980. A cooper has made for me a cask, the length of which is 38 inches, and the head diameter 20 inches. I wish him to make me a similar cask that shall hold 3 times as much. What should be its length, and the diameter of the head?

981. Moses Adams and William Otis paid the same price for sugar. Adams sold it at a profit of 9 per

cent., and Otis sold twice as much at a loss of 8 per cent., when they found that Otis had received \$1500 more than Adams. How much had Otis lost? How much had Adams gained?

982. A building rents for \$650 per annum; the taxes and annual repairs amount to \$100 per annum. Allowing 10 per cent. per annum for interest and depreciation by time, what is its value?

983. The base of a right pyramid is an equilateral triangle, one side of which is 24 ft. The slant height of one edge is 36 ft. What is its solidity?

984. If 6 men, in 3 months of 4 weeks each, working $5\frac{1}{2}$ days per week, and 10 hours per day, can set the type for 5 books, each containing 700 pages, each page containing 110 lines, the lines averaging 16 words, and the words 8 letters; in how many months of $4\frac{1}{2}$ weeks each, will 5 boys, working 5 days per week, and 12 hours per day, set the type for 3 books, of 650 pages each, each page containing 125 lines, the lines averaging 21 words, and the words $7\frac{1}{2}$ letters, each boy doing $\frac{2}{3}$ the work of a man?

985. A grocer exchanged 75 lbs. of coffee for tea worth $37\frac{1}{2}$ cents per lb. How many lbs. of tea did he receive, and what was the value of his coffee, the price of $6\frac{1}{2}$ lbs. of coffee being equal to that of $2\frac{1}{2}$ lbs. of tea?

986. If a globe 15 inches in diameter weighs 120 lbs., what will a globe 15 in circumference, of a mate-

rial the weight of which is to that of the other as 7 to 3, weigh?

987. A pendulum which vibrated seconds at the level of the sea was found to vibrate 3595 times in an hour on the top of a mountain. How high was the mountain above the sea, the times of vibrating being in proportion to the distance from the centre of the earth, and the earth being 7912 miles in diameter?

988. A young man received \$420, which was $\frac{1}{3}$ of his elder brother's share, and 3 times his elder brother's share was half the father's estate. What was the father's estate?

989. One gallon, 2 quarts, 1 pint, 7 cubic inches, to the hogshead, is what per cent.?

990. If a cubic foot of air weighs $\frac{1}{13}$ lb., and a cubic foot of hydrogen gas weighs $\frac{1}{178}$ lb., what weight would be sustained by a globular balloon, 32 feet in diameter, perfectly inflated with hydrogen gas, allowing the balloon itself to weigh 75 lbs.?

991. The base of a right pyramid is a regular hexagon, one side of which is 20 feet. The distance from the apex to the centre of one side is 80 feet. How many cubic feet does it contain?

992. A gentleman had expended $\frac{1}{4}$ of his income in the yearly increase of his library. Having received an addition to his income, he expended $\frac{1}{3}$ of it instead

of $\frac{1}{4}$ for the same purpose yearly, and had the same amount left for other purposes as before. What proportion of his former income was the addition?

993. A vessel, beating against an easterly wind, sails south-easterly 150 miles, making 2 miles of latitude to 1 of longitude; then, tacking, she sails north-easterly 180 miles, making 3 miles of latitude to 4 of longitude; she then sails due south 65 miles, and then north-easterly 160 miles, making 2 miles of latitude to 7 of longitude. What is her latitude and longitude with respect to the port from which she sailed? What is her distance from that port, considering the surface of the water a plane?

994. A quantity of grain is heaped in the corner of a square room, so as to form a portion of a cone. The perpendicular height is 6 feet 4 inches, and the slant height 9 feet 2 inches. How many bushels in the pile?

995. I owe Samuel Jones \$650 to be paid in 90 days, \$300 to be paid in 60 days, and \$450 to be paid in 30 days. In how many days may I cancel the whole by a single payment of \$1450, allowing 6 per cent. interest?

996. A man bought 1000 bushels of new wheat at \$1.62 $\frac{1}{2}$ per bushel. He found it necessary to spread it to dry, and paid \$10 for the work. In drying, it shrunk 5 per cent. It then weighed 68 lbs. per bushel. He then mixed with it 75 bushels of corn, weighing 52

lbs. per bushel, for which he paid 80 cents per bushel, and had it made into flour, paying the miller 5 per cent. of the flour, and agreeing to give him whatever portion of his part there might be left after filling as many barrels as he could. He found the flour to be 71 per cent. of the grain, by weight. He paid 34 cents each for his barrels, and sold the bran for \$30. What did his flour cost him per barrel?

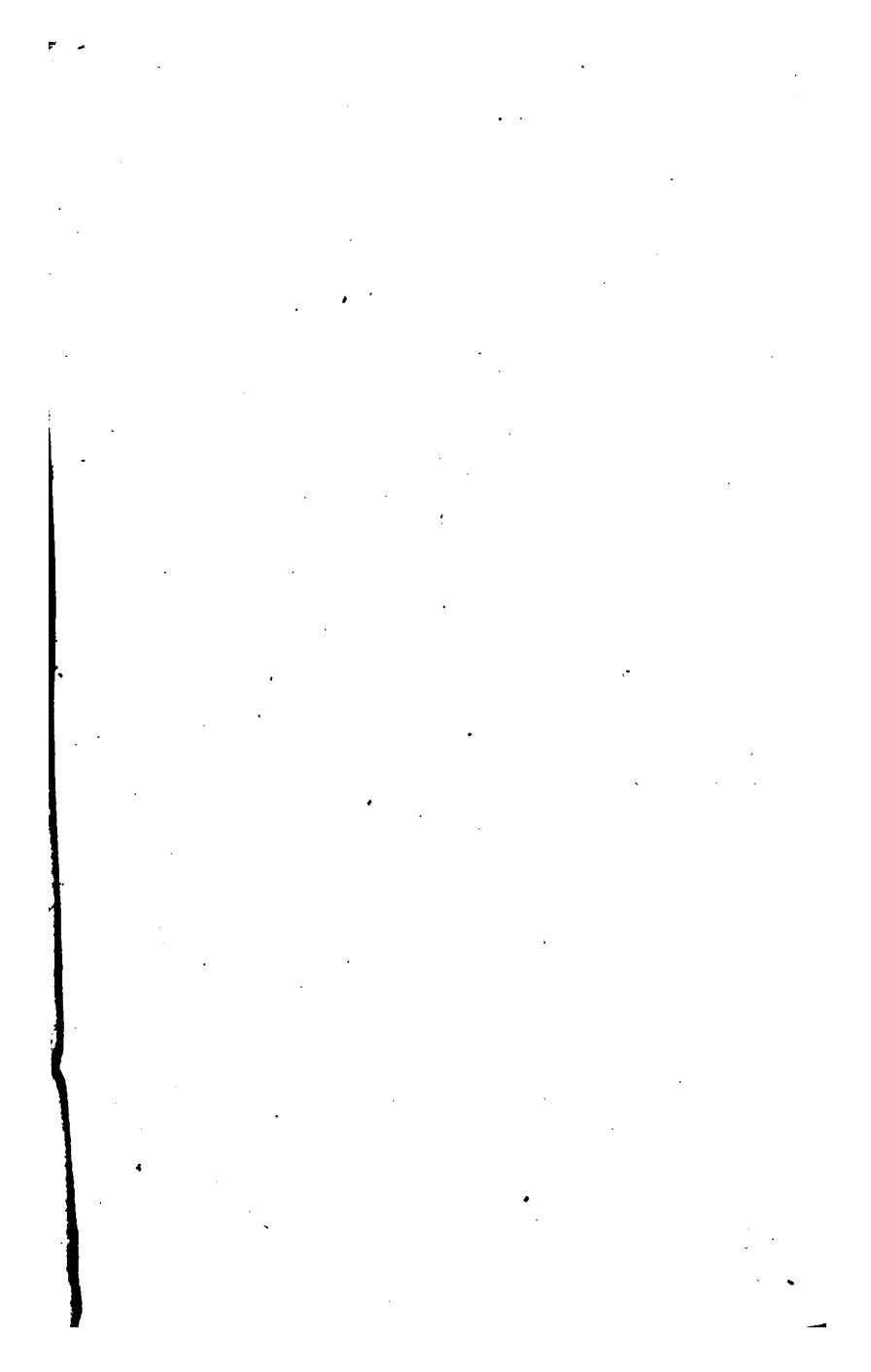
997. If a beam 24 feet long, 6 in. thick, and 8 in. deep, resting on the ends, will sustain a weight of 2000 lbs. placed on its centre; what weight, placed 10 feet from one end, will a beam of the same material, 40 ft. long, 10 in. thick, and 18 in. deep, sustain, allowing the strength of beams to vary directly as the thickness and the square of the depth, and inversely as the length and the product of the distances of the weight from the two ends?

998. If, on the 1st of January, I buy goods to the amount of \$10,000, and on the 1st of each month during the year buy to the amount of \$5000, all on 6 months' credit; and sell at cost to the amount of \$5000 per month for cash, selling the stock remaining at the end of the year at a loss of 10 per cent., and, on the first of each month, pay the amount received during the preceding month towards my notes, receiving a discount of 12 per cent. per annum for the payment of money before it becomes due, what do I gain in all?

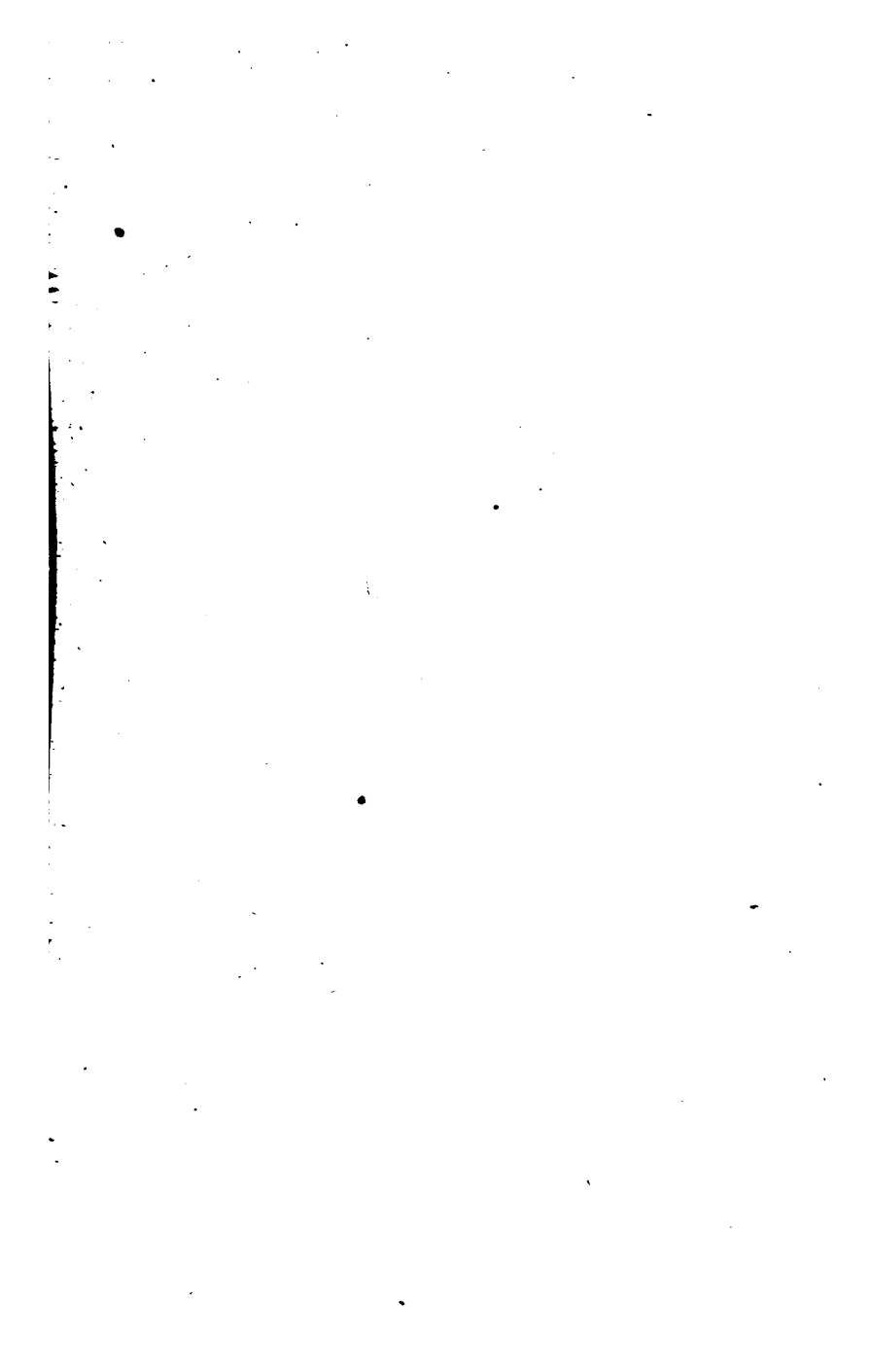
999. A vessel sails, from a station A, due south 70 miles to a station B, thence due east 40 miles to a station C, thence due south 30 miles to a station D, thence

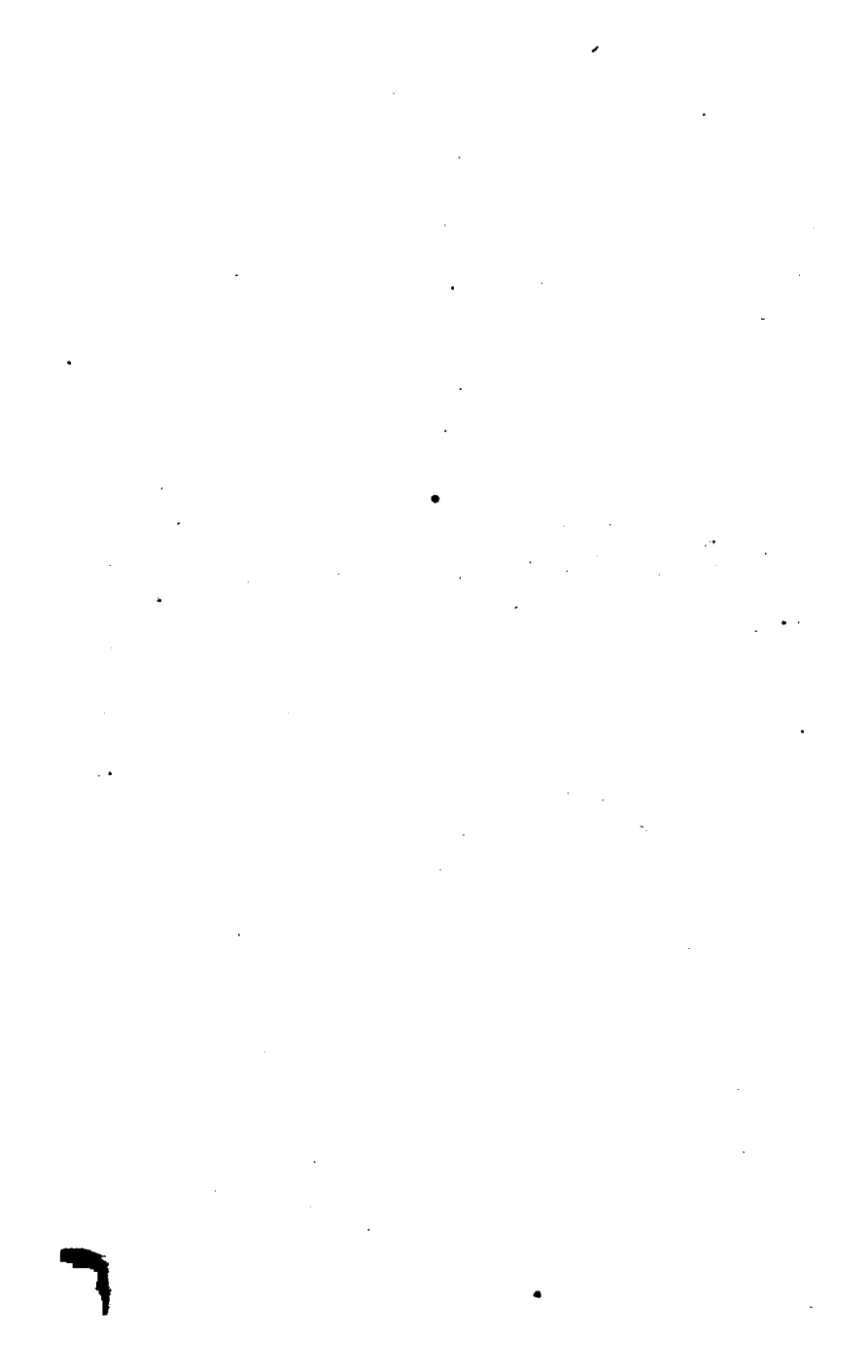
due east 60 miles to a station E. From the last station she sails south-westerly 145 miles to a station F, which is found to be just 55 miles in latitude further south than station E; thence she sails north-westerly 125 miles to a station G, which is found to be in longitude just 48 miles further west than station F. Considering the surface of the water a right plane, how far is she now from each of the other stations?

1000. If the specific gravity of quartz is 2652, and that of gold 19259, and the specific gravity of a mass of quartz and gold weighing 210 ounces is 4562, how many ounces of gold in the mass?









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